# MOTOR AGE

Vol. XXXII No. 24 CHICAGO, DECEMBER 13, 1917

Ten cents a copy Three dollars a year



# Champion "Minute" Spark Plug Cleaner

## Clean Plugs —and hands clean

WITHOUT taking the plug apart, in a fraction of the time it used to take to half-clean your spark plugs, you can now get them really clean without even soiling your hands.

Just half fill the tube of the cleaner with gasoline, screw the plug in the socket at the top and give it a vigorous shaking.

The gasoline softens the carbon and the little flying needles pick it off in small particles, leaving the plug cleaner than you could get it in the old laborious way. Champion Minute Spark Plug Cleaners sell for only 75 cents, come in a neat wooden box that will pack neatly in one's tool

They are a ready-selling money-making article for supply dealers and garage men everywhere.

Any jobber of automobile accessories will supply you.

Write for any information desired.

Champion Spark Plug Co., Toledo, Ohio



#### JOHNSON'S

REEZE-PROOF

Prevents Frozen Radiators

PREVENTS THIS



JOHNSON'S Freeze-Proof, in the water of your cooling system, lowers the freezing point to from 5° to 25° below zero. Above this temperature the water absolutely can not freeze, even though the radiator is left unprotected by any sort of hood or robe.

The only way that you can be positively sure that your radiator will not freeze up, is to use a non-evaporating anti-freeze preparation. You can never be sure of alcohol, or any other product that evaporates with the water.

Insist upon your dealer supplying you with Johnson's Freeze-Proof. Packages containing 6½ pounds, \$1.50 each. One application should be sufficient for the whole winter.

PREVENTS THIS



If your dealer can not supply you, use the coupon, and we will fill your order direct, prepaid Parcel Post in U. S. A., east of the Rockies.

Write for Our Free Folder— "Keeping Your Car Young." It Pays

S. C. JOHNSON & SON Dept. MA. RACINE, WIS.

PREVENTS THIS



PREVENTS THIS





# GURNEY BALL BEARINGS

#### **More Exact Knowledge**

about ball bearings is essential today, because the service expected of a ball bearing is so much greater than in bicycle days. A single modern ball bearing is sometimes called upon to carry thirty tons.

Mr. F. W. Gurney, our Chief Engineer, has made a close study of the science of ball bearings and their application, and we are proud to say that no living man is better qualified to speak authoritatively on the subject.

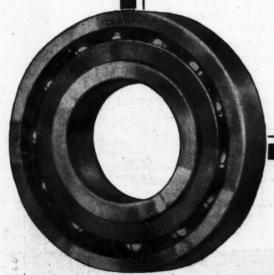
The skill and experience of Mr. Gurney and his able assistants are at your disposal, for the solution of your important bearing problems.

> We will gladly explain why GURNEY BALL BEARINGS have greater load capacities than other ball bearings.

#### GURNEY BALL BEARING CO.

Conrad Patent Licensee

Jamestown, N. Y.



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THE quality refinements of New Departure Ball Bearings are years in advance of most American products.

Added to American genius for achievement, New Departure methods have sensed the advantages of profound study of detail.

New Departure Ball Bearings are rich in accumulated betterments.

Among the improvements which make the New Departure a superior bearing are exclusive heat treating and manufacturing processes, exceptionally resilient chrome alloy steel, deep raceways, maximum size and number of balls and an exquisite accuracy of finish.

Add to these qualities prompt deliveries and New Departure service, and you have every reason why your choice should be New Departure Ball Bearings.

THE NEW DEPARTURE MFG. COMPANY, Bristol, Conn.

NEW DEPARTUR BALL BEARING

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### MOTORAGE

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#### **NEXT WEEK**

Next week is MOTOR AGE'S last issue until after Christmas. For this reason the holiday spirit as manifested in motor ways will be observed in special stories and otherwise. Among the features will be an article on how motorists, and motor clubs in particular, can help take Christmas to the more unfortunate.

## "NORMA" BALL BEARINGS

(Patented)



The "nerve centers" of the car and truck—so may be defined the ignition and lighting apparatus. Weakness, inadequacy, at these centers reacts throughout the machine. Failure at these points means a failure of all the nerve-controlled functions of the car or truck. Can a car, truck, or man show "stamina," with an inherent weakness at the nerve centers?

"NORMA" Ball Bearings, by their superlative speed qualities and proved serviceability, contribute mightily to the rugged strength and service capacity of those high-grade magnetos and lighting generators which are the "nerve centers" of all cars and trucks of proved dependability.

Be SURE. See that your Electrical Accessories are "NORMA" Equipped.



#### THE NORMA COMPANY OF AMERICA

1790 BROADWAY

NEW YORK

Ball, Roller, Thrust and Combination Bearings

# Structe Burnett

FEW people have any conception of the manufacturing facilities behind the Studebaker cars, or the magnitude of the operations involved. The great Studebaker foundries, forge shops, steel stamping works, heat-treating plants, machine shops and body works assure the dealer and owner on two vitally important points.

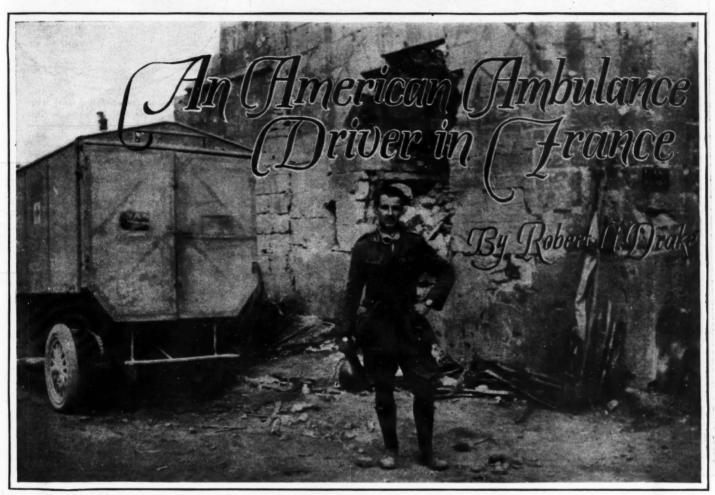
First, that the finished product is wholly a Studebaker creation, worthy of the best traditions of a 65-year leadership among American manufacturers—and as such, a product for which Studebaker is proud to assume *complete* responsibility.

Second, that the huge investment behind this vast successful enterprise makes it certain that, regardless of conditions during the war or after the war, here is a great company that is in business to stay and to deliver to the public a high grade product at a reasonable price.

#### STUDEBAKER

Detroit, Mich. South Bend, Ind. Walkerville, Ont.

# MOTORAGE



This is the first of a series of articles by Robert A. Drake, Harvard, '18, of Franklin, N. H., who drove an ambulance on the French front from Feb. 22 to Sept. 1 of this year. Mr. Drake, who is shown in the photograph above, was driving for the American Red Cross. The picture was taken in August, 1917, within 1160 yds. of the front trenches with an old type French ambulance

MONTH before the United States A declared war on Germany, the air was rife with rumors about the spring drive to come. I left Harvard in the early part of February to join the Norton-Harjes Ambulance, partly because I always had wanted to join my brother at the front in France. but mostly because I wanted to take part in that Big Push. I began to question the popularity of the coming matinee in the western theater of war when I saw how few passengers there were on the French steamer "Espagne." Germany's declaration of unrestricted submarine warfare had reduced the already small number of travelers to less than a hundred.

The boat was sealed hermetically every night lest some chance ray of light give away our position to the omnipresent U-boats. Even the red and green lights

on the bow were extinguished and cigarette smoking was strictly forbidden after 6 p. m.

One of the passengers, a stout curio collector by the name of Mr. Meally, brought all hands on deck one afternoon by bellowing in a stentorian voice "Periscope!" but he had given a false alarm. The bobbing black dot on the water proved to be only a floating spar. Our wireless operator reported that the U-boats were sinking ships behind us, in front of us, north of us and south of us, but we anchored in the river at Bordeaux with nothing lost but a few nights of sleep.

Gay Paree was an endless succession of muddy streets, drizzling rain and heatless hotels when we got there, so it was not strange that we welcomed our departure for the front after a three-weeks' stay. We arrived out there in time for the Big Push, but Russia's inactivity allowed the Germans to mass many crack divisions against the French. In consequence, the advance was all the poilus expected but not as great as they hoped for.

Our ambulance work near Laon continued intermittently from the spring well into the summer, and the interest of our work increased daily for several reasons. We were in a hot sector, that is, both the French and German troops attacked every night, as that point of the lines northeast of Soissons had perhaps the greatest strategical value of any part of the French lines, Verdun not excepted. If there is any phase of army life the ambulance driver loathes and abominates, it is monotonous safe work in a quiet sector, but we were spared this evil. In Section

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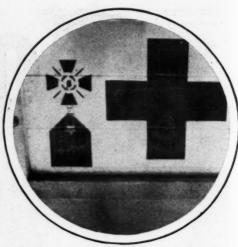
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Three American college boys, ambulance drivers in France, indicate spare time joys. While one shaves the others furnish music. All work and no play is as bad for an army as for business



Taking on wounded 1000 yds. from the front trenches. Drake is letting down the stretcher racks to place the wounded man in the ambulance, which bears the inscription shown above, the conventional Red Cross, the palm for distingguished service, and the star representing a division on the badge

5 of the Norton-Harjes Ambulance, three men were wounded and four overcome with gas in six months' time, a casualty list of 25 per cent. All the cars were hit by shells except one, and my Packard 48 was struck four times for a total of sixteen holes. A piece of an airplane bomb scarred my cheek slightly, and a wave of German gas almost made me unconscious, but I finished the six months' service stronger physically and mentally than when I joined the section.

As volunteers we were treated like officers in every respect. We had officers' accommodations, officers' uniforms and what was far more important, officers' food. But I do not mean to imply that the men in the ranks starved. Every man's digestive apparatus was working at top speed after meal time, but as officers we had "ravitaillment" of better quality.

The terrible sights we saw at the front were easy to endure under one condition—with plenty of danger and excitement to offset the shock of seeing torn bits of human flesh. We had that antidote always with us. The whistling, shrieking shells made us forget the pools of blood quite effectively.

#### Drove in Open

Unlike the infantrymen who stayed buried in the trenches, unlike the batterymen who concealed their guns under camou-flage screens and shot at the enemy by telephonic direction rather than by sight and unlike the cavalrymen who drove up the supply teams in the blackness of night, we drove our ambulances in the open day and night, sometimes far beyond the communication trenches within full sight of the Boches. We saw all the different phases of warfare at first hand. We ran from the third line trenches past piles of reserve supplies and barbed wire entanglements, past the batteries of light field guns that roared incessantly. Then we went by the naval guns farther in the rear, over pontoon bridges, past the engineer's supply stations till we reached the field hospitals, 5 or 6 miles in the rear. We

The upper scene shows the French cutting trees 15 to 30 miles back of the front to make spokes for wheels and other parts, while the lower is of an ambulance kitchen which serves a section of twenty-two. Three chefs are on the cooking force and are supplied with materials by motor truck which visits them daily

passed miniature railway trains bringing up munitions, and we ourselves carried back the stream of bruised flesh that flowed faster or slower to keep pace with the up stream of steel.

Every ambulance man learned his lessons at the front, learned to allow for exaggeration and distinguish between hearsay and fact, learned the art of adaptation—to take things as they came and make the best of them. When a German shell knocked down a wall near our dugout, we did not complain; we simply used the rock that was cracked so conveniently to repair the roads. Everywhere in France this spirit of adaptation rules. Chateaux are now hospitals, limousines are made into ambulances, and Parisian omnibuses are converted into meat trucks.

War is teaching us this same lesson of adaptation on this side of the Atlantic. Red Cross headquarters are established in private homes, and army offices are in business buildings.

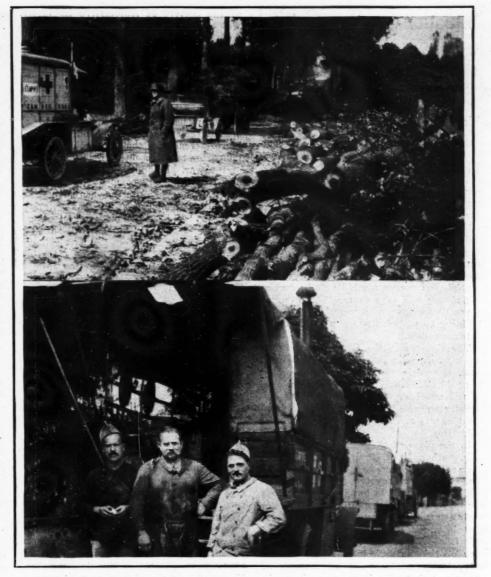
The ambulance man learns patience at the front, for the war is a game of waiting. He waits for his soup, his smokes and his mail; he waits for word to leave for the front and for orders to retire. He learns to keep and cultivate his sense of humor. The soldier world has no pity for the man who cannot crack a smile and play ring around the rosy with the rest of the gang.

#### Innate Curiosity of French

For instance, we learned why the French drive back the Germans in spite of the superior trench equipment of the Boches. The Frenchman has an innate curiosity—he has to see all that is going on, so he disobeys orders to stay under cover and comes out of his dugout to watch the German airplanes flying overhead. The Boche air observers see the crowd below and direct the German batteries to fire on that locality. In consequence of the bombardment the French suffer a few casualities.

In trench construction the French soldiers calmly smoke cigarettes while the Huns 50 ft. away are constructing elaborate concrete fortresses for protection against shell fire. The poilu's line of reasoning is this: "I'll be leaving this trench to advance in a day or two, so what's the use of wasting all that extra energy building dugouts I'll never use."

But when the signal is given, the French go over the top. French impetuosity more than makes up for Boche efficiency. The poilu likes the charge with cold steel. He hardly can wait for the order to climb the scaling ladder. He often leaves the trench too soon and gets killed by his own artillery fire. But when that flying poilu hits the German trench, like a pinwheel of steel projections, the slow-going German either is killed at once or hides in his dugout. In the latter case the poilu merely ends the engagement by throwing a few sputtering hand grenades into the caves as persuaders.





This shell hole, 12 ft. deep and 25 ft. in diameter, was made by a German airplane bomb, which was in the form of a dart 4 or 5 ft. long and weighed several hundred pounds

#### Situation at the Capital

#### Washington in General Reflects Changes in Council of National Defense

#### Horning Has Complete Supervision of Motor Products

WASHINGTON, Dec. 10—Special telegram—Vital changes marking emphatically closer co-operation with concentrated and wisely directed purchasing and executive power will be made in the Council of National Defense this week. This will be the first substantial proof of the fact that our Government, recognizing the futility of drastic curtailment of industry and classification of industries as non-essential, has chosen a middle path combining a safe and sane course that forecasts a positive rather than negative action, a building up of industrial power instead of a tearing down.

The changes in the Council began last week when, as was announced in Motor Age, the various subcommittees resigned to avoid the embarrassing situation wherein the members of these committees frequently were called upon both as Government agents and as representatives of the industries.

In the place of these industries individuals, authorities in their industries, have been selected. The changes that are to be made this week evolve about these individuals who are to be given full powers for representing both the Government and their respective industries on all matters pertaining to production, purchases and priorities. This means that the representative of the motor industries will handle all priority matters and all matters of every sort that arise in the Council and in any way affect the industry.

In the future H. L. Horning will have complete supervision of the truck, military tractor, motorcycle, engines and accessories, airplane parts, motor boats and gas engines, and through him these industries will have full representation on the War Industries Board on all matters pertaining to priority and general production and pur-

#### Details Lacking

All details of the proposed changes in the Council are not yet available, but it is known that the new plans contemplate complete harmony with the President's request in his message before Congress last week, when he asked for a concentrated group of purchasers to avoid waste and inefficiency that would otherwise be beyond his control.

The War Industries Board of the Council will follow in the completion of the new plans and secure everything that is required by every Government department. Since the War Board has presidential powers, greater than those of any division of the Government, it may be anticipated that there will be radical departures from the present methods of purchasing and of supervision.

It is reported in authoritative circles that Coker F. Clarkson, general manager

of the Society of Automotive Engineers, will collaborate with Mr. Horning in his duties and will be given an official title.

The War Board for conversion of industries, headed by George N. Peck, will operate along a fixed policy, which demands that there will be no curtailment of what may be considered less essential war industries, as such. When there is not enough coal, raw material or freight cars to go around, the subject will be handled by giving preference for the time being to those industries most essential for the conduct of the war. In addition to this the new board will aid any company less-essential and seeking such aid in converting its plant to the manufacture of war materials so that it will become a preferred plant and secure preferred treatment. Contracts for the assembly of class B trucks have been let and the Military Truck Production Board now will turn its attention toward the assembly of the class A trucks, contracts for which will not be let for some time but which will require considerable detail work in the meantime.

Liberty aviation engine production is succeeding as per news dispatches to the highest point of expectation despite many rumors to the contrary.

The test drives of the class B sample trucks continue with more than 3000 miles to their credit and with no display of important defect.

#### G. M. CONTROLS SCRIPPS-BOOTH

Detroit, Dec. 10—As has been known for some time, control of the Scripps-Booth Corp. has passed into the hands of the General Motors Corp., and at present reorganization of the company and plans for the future are being made. Clarence H. Booth resigned from the presidency and A. H. Sarver, a former Buick man, has been in practical control. Dec. 14 it is expected that the reorganization will be completed. Though the details of the first meetings are held confidential, it is expected that A. H. Sarver will be president.

#### TO HELP CONVERT PLANTS

Washington, Dec. 8—George N. Peck, vice-president of Deere & Co., Moline, Ill., and a member of the executive committee of the National Implement & Vehicle Dealers' Association, has been appointed industrial representative of the War Industries Board to direct the conversion of manufacturing facilities for war work. Mr. Peck will meet with manufacturers who have facilities that may be devoted to munitions manufacture and will consider to what extent such plants may or should be used for such purposes and advise the board in the premises.

#### **GUN-SITE WAR ORDERS**

Washington, Dec. 10—Special telegram—The Automobile Industries Committee has 7000 complete gun-site assemblies, approximating \$3,000,000 worth of business, to be distributed to manufacturers. Deliveries are to start in three months and material used is to be bronze and steel. The committee has blue prints of this work on hand and suggests that manufacturers desiring such work, which is a tool room job, get in touch with it at Washington.

#### Council Is Reorganizing

#### Experts Appointed Government Employees Without Private Industry Connections

#### Creation of Representative Committees Has Been Advised

Washington, Dec. 8—The "co-operative committees of industry" of the Council of National Defense have been dissolved and experts in the various lines of industry will take their places as Government employees and expert advisers, while the council has recommended that representative committees be created by the industries themselves to deal with the Government through the new advisers. heads of committees aiding war work will remain unchanged, and many of the men named as expert advisers formerly served on the old committees. From now on they will represent the Government alone and have no connection with private industries.

The new committees are grouped under three heads, those affecting raw materials, finished products and supply. Bernard Baruch heads the raw material section, with L. L. Summer adviser on explosives; Eugene Meyer, Jr., on nonferrous metals; J. L. Replogle, on steel; J. F. Guffey, on oil; R. H. Downman, on lumber. S. M. Clain is chairman of the finished products section, while Rear Admiral A. R. Couden is assistant. Julius Rosenwald is chairman of the supply section and adviser on fabrics; Charles Eisenman, adviser on cotton duck; A. L. Scott, on shoes; A. W. Lawrence, on wool.

#### BAKER FAVORS MOTOR RESERVES

Washington, Dec. 10—Secretary of War Baker, who recently received notice of the Minnesota Motor Reserve, composed of owners who give the use of their machines to visiting officers of the Army and other representatives of the government—a plan of patriotic service originally suggested by Motor Age—is hopeful that other states will follow in the footsteps of the northwestern motorists.

The association advises Secretary Baker that in various Minnesota towns and cities motor reserve branches have been formed, the members signing a pledge to assist the state and federal governments in every way possible during the war.

#### PRISONERS MAY MAKE ROADS

Washington, Dec. 10—Prisoners in the United States army and navy prisons can be employed in the construction of military roads and highways upon the passage in Congress of legislation introduced at this session by Senator Hoke Smith of Georgia.

The purpose of Senator Smith's bill is to provide for the employment of prison labor for the production of war supplies, the details of which the War Bureau of the National Committee on Prisons and Prison Labor and the officers of the American Federation of Labor have been preparing since the United States entered the war. The bill authorizes the Secretary of War and the Secretary of the Navy to employ military prisoners in the manufacture of war supplies and in the construction of military roads, to make agreements for the use of the necessary machinery and the finding of available material and to supervise the work of county and state highway officials who may be charged with the development of the proposed roads.

Army prisoners already are employed on road work within the cantonments of the National army. The bill will make possible their employment on roads leading to the cantonments. In many instances the cantonments are without good road connections with the railroads and main highways, making the transportation of food and supplies a matter of considerable difficulty in bad weather.

Employment of army and navy prisoners is not to be confused with the employment of German prisoners of war interned in the United States. This matter requires no legislation, and is receiving careful consideration by the departments concerned. Switzerland's experience in the employment on road-building of German and allied prisoners of war is being reviewed in this connection. Prisoners of war interned in Switzerland work for their own welfare and for a wage, and Switzerland has benefited by the continued development of her excellent system of highways.

#### END TO SPEEDING SOUGHT

Baltimore, Md., Dec. 7—Drastic legislation, that will include jail sentences for speeders, will be presented at the coming session of the Maryland legislature, which convenes in January, by the commissioner of motor vehicles, who takes this step after trying in various ways to break up the speeding, which has resulted in 138 deaths in Maryland this year, and hundreds of persons being injured. Motorists at the present rate will pay in fines into the state treasurer more than \$70,000, which goes toward the road maintenance.

Many of the accidents have occurred between Washington and this city on the Baltimore and Washington boulevard and last Sunday more than a score of machines were wrecked, several persons being killed and a number injured.

#### TWO MORE COMMITTEE ENGINEERS

Washington, Dec. 8—The Automobile Industries Committee has added two more engineers to its staff. P. A. Bolinger of the Columbia Motors Co., Detroit, and William Caines of the Interstate Motor Co.

#### STEGEMAN BECOMES HERCULES

Milwaukee, Wis., Dec. 7—The Stegeman Motor Car Co. has reincorporated as the Hercules Motor Truck Co. with a capital of \$100,000. The manufacture of six-cylinder, worm-drive trucks will be continued as before.

#### LOCOMOBILE STRIKE AVERTED

Washington, Dec. 10—Special telegram— The Department of Labor has prevented a threatened strike of 2000 men workers at the Locomobile company at Bridgeport, Conn.

#### B Truck Contracts Let

U. S. Allots Orders for War Vehicles in Groups of 500 and 1000

One More Lot for Assembly to Be Given

WASHINGTON, Dec. 11—Special telegram—Contracts for assembly of 500 class B trucks each have been let to Kelly-Springfield, Service, Republic, Bethlehem, Kissel, Diamond, United States Motor Truck Co., Brockway, Velie, Sterling Motor Co. and to the Garford. Contracts for 1000 have been let to Gramm-Bernstein, Selden, Pierce-Arrow and either 500 or 1000, not yet decided, to General Motors. One more contract for 500 is to be let.

#### Scope of Aerial Plans

WASHINGTON, Dec. 11—Special telegram-W. F. Durand, chairman National Advisory Committee on Aeronautics, outlining new plans and scope for work of new civil aerial transport committee, stated that mail and freight carrying, location of vessels in distress, destroying of derelict vessels, mapping of United States and carrying passengers are some of the duties the Government proposes to put airplanes to after the war. He told how planes have been developed able to carry twenty-five passengers and travel at 150 m.p.h., ascend 41/2 miles and cover 1000 miles without a stop, that France, England, Bavaria and Germany already have plans laid for aerial traffic systems. Congress already has appropriated \$100,000 for aerial mail delivery and War Department has agreed, subject to Congressional approval, to turn all planes not longer adaptable to military use over to Postoffice to start air service.

#### CYLINDER OIL COSTS MORE

Chicago, Dec. 7—Standard Oil of Indiana has increased the wholesale price of cylinder oil 2 cents a gallon, and other engine oils have been advanced from 1 to 5 cents a gallon throughout the entire territory served by this company. Lubricating oils advanced from 1 to 5 cents a gallon wholesale in New York last week.

#### REPRESENTS WILLYS-OVERLAND

Washington, Dec. 8—C. W. McKinley, consulting engineer for the Willys-Overland Co., has been detailed to this city to work with E. C. Morse, Willys-Overland representative here, on all matters regarding Government affairs in which the Willys-Overland Co. is interested.

#### OHIO DEALERS PLAN WORK

Columbus, Ohio, Dec. 10—The Ohio Automobile Trade Association has the best chance for a good future that it has ever had. Wednesday at a convention here, \$14,500 was subscribed for a year's active work, new officers were chosen and a manager is to be hired. It is planned to work hard between now and the end of January and at that time to have another conven-

tion of what is practically a new association. It is believed that at that time there can be from 200 to 500 tradesmen at the meeting and that the membership will embrace the best people in the state.

The association resolved to aid the fuel administrator in cutting out gasoline and oil waste, by not running engines idle, by advising owners not to, by not using gas for washing parts and by similar means.

Andrew Auble, Akron, told how he has been saving oil waste. When he takes dirty oil from crankcases and gearcases he puts it into a can until he has 3 or 4 gal.

Then he puts in a gallon of water. He heats the can on a hot plate until it is warm enough to permit the sediment to drop down into the water.

Then he puts in enough water to drain off the sediment and has several gallons of good oil.

#### BUMPER ASSOCIATION DISSOLVED

New York, Dec. 10 .- The Automobile Bumper Association, formed about a year ago by the principal manufacturers of bumpers, has been dissolved by the consent of the manufacturers to a decree of the United States District Court for the Southern District of New York. The association was concerned with the pooling of patent rights and price regulation. The corporations mentioned in the decree are: Gemco Mfg. Co., Central Brass & Fixture Co., Emil Grossman Mfg. Corp., J. H. Sager & Co., Inc., Cox Brass Mfg. Co., Milwaukee Auto Engine & Supply Co., L. P. Halladay Co., American Brass Co., Auto Compressor Co., U. S. Auto Bumper Co. and Auto Parts Mfg. Co.

#### TO HELP U. S. EXPORTERS

New York, Dec. 7—The utmost considration to all requests for the importation of goods sold through the Lyons, France, sample fair, March 1, 1918, will be given by the French Foreign Office, according to a cablegram. In view of the present French regulations requiring licenses for practically all imports into France, any concessions which the Foreign Office may have in view will be of service to American exporters.

#### CABINET TO TALK TO EDITORS

Washington, Dec. 8—The biggest men in the Nation's affairs will address the trade press of America at the Editorial Conference to be held here Dec. 13. Members of the Cabinet and Council of National Defense will bring the reading public in touch with what is being done in their fields through their talks to the editors.

#### FEW AUSTRIANS IN CAR PLANTS

Detroit, Dec. 7—Declaration of war on Austria-Hungary with the attendant removal of all alien enemies from the factories may remove from 5000 to 7000 workers. Sometimes no foreigners have been employed unless they already had taken out their first citizenship papers. Though the shortage of skilled labor is quite acute, the above condition will not affect production to any great extent, as it represents such a small proportion of the whole. The Ford factory alone employs from 30,000 to 40,000 men.



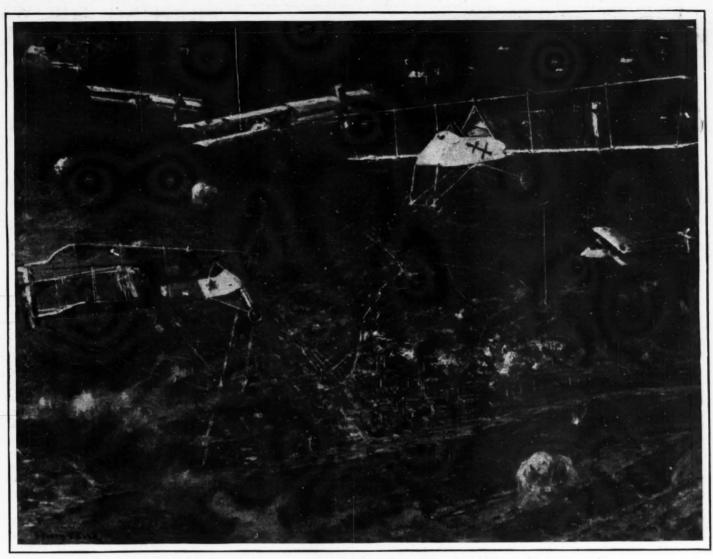
#### FIGHTING THE WAR WITH PLANE, TRUCK AND CAR TO BRING DEMOCRACY TO ALL

A truck brings up men and apparatus for a liquid fire attack. The men are shown here leaving the truck at the front for the attack. The poilus belong to a special corps expert in the handling of the gas and flame in attacking

A French triplane while fighting at a height of 9000 ft. with a German plane caught fire, and this is what was left of it—the plane's frame. The three aviators met death but not until they had brought the enemy down also. Below is one of our airmen in England learning the potentialities of the so-called plane joy stick

Our French "cousin" gives the American boys in France a hand when they need a lift, heaving casings on the truck shown here. Note the ground. It is typical of the condition of the country along the fighting sections in France



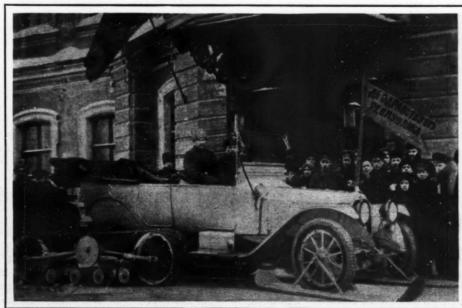


Here is one of the collection of paintings by M. Henri Farro, official aviation artist of the French government, which will be exhibited in this country. M. Farre took part in many of the fights he has painted as machine gun observer. This represents the bombardment of Ludwigshafen. Arrangements have been made to exhibit it with the rest of the collection in the principal cities of the United States under the auspices of the Aero Club



The former czar's car also was put on runners and is being used by Russian officers in and around Petrograd. It is operated by leather belts with rubber facings, the front wheels being on the runners. The machine is capable of 100 m.p.h. over frozen surface







#### EDITORIAL PERSPECTIVES



#### Clearing the Decks

WITH the news of the reconstruction of the Council of National Defense comes the knowledge that the country as a whole and the industry as part of that whole are to have a closer, more efficient and, hence, more effective representation in these times of war stress. The Council was established to bring about the co-ordination of industries and resources for National security and welfare. Before the declaration of war even steps had been taken by the Council to mobilize the industries of the country so they could render the most efficient assistance to the Nation in its hour of need. As that hour of need became more apparent the Council extended its efforts until now it is co-ordinating its many activities in an effort to arm itself to meet the demands of growing war needs.

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THE Council is on a war basis. It is for war service, and it is doing war work. Many industries were not organized in time of peace to aid the Nation effectively in war. Such reorganization by the industries involved delay, for few could realize what the Government would need from them in the emergency. Therefore, the Council authorized co-operative committees of industry composed of men representative of their respective lines. No other means existed or could have been created at that time to accomplish the vital task brought on by the war.

THE committees have given faithful, patriotic and invaluable assistance to their Nation. Many of the individuals have served without expectation of recompense and with great personal and financial sacrifice. We should all thank these men who so unhesitatingly responded to the Nation's need.

TIME has indicated the need of a more permanent mobilization of industry, however, and the reorganization is the result. In a way the committees were placed in a position unfair to themselves and to the people. This position will be remedied by the appointment of highly qualified individuals as Government employees and expert advisers and by representative committees created, not by the Government, but by the industries themselves. Many of the men appointed formerly served on the old committees. They are serving as direct employees of the Government and expert advisers without any connection with a private industry.

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EN no longer will be placed in the embarrassing position Government agents or advisers and as representatives of industry. In dissolving the present co-operative committees which were appointed by and under the direction of the Council of National Defense the step is made with the highest praise and thanks for their splendid and indispensable work, and at the same time with the hope that representative committees of the industry will be formed by the industries themselves at the earliest possible moment. The establishment of such committees, formed so as to entitle them to speak for their entire industries, will render immediately available valuable sources of information upon which the Government can draw in connection with the countless business and industrial problems attendant upon the conduct of the work necessary for the prosecution of the war. In other words, the country as a whole and industry as part of that whole are clearing the decks for action.

#### Highway Transportation Necessary

THE American Automobile Association has placed itself on record as convinced that highway transportation of passengers and freight must be greatly amplified in order that the motor vehicle may attain its maximum utility in the present congested condition of our avenues of communication. This is the opinion of many who can look at the matter of road-building and motor traffic from a national standpoint. It is one of the most vital questions of today, in the consideration of which all transportation facilities are being co-ordinated as outlined in this issue.

M. M.

It is a general belief that the average car owner now employs his vehicle at least nine-tenths of the time for so-called utility purposes. This is decidedly the case in the country, and such is true also in the city.

WE should not needlessly consume fuel and rubber in sightseeing tours, but the A. A. A. tour bureaus in Washington and New York report an unusually large number of owners who spend their winters in the Southern states and on the Pacific coast, making their journeys over the road instead of seeking transportation by rail for their vehicles and even for themselves.

30 M

THE office of Public Roads is advocating concentration of road-building activity on those highways most important at this time but it does not advocate a slackening or halt of road-building. The roads are the arteries of a Nation in peace and in war. They are even more fundamental as such now when the burden on the railroads is proving too heavy.

#### Ordnance Department Needs Men

MODERN war is a tremendous business, and the army that wins is the army which has the best equipment and the best men. The men are over there now—they are ready to go ahead, but they still need experts in our line to repair and maintain their equipment. There is a fine chance for every man who wants to help. There is an enlistment blank on another page. If you are an expert and can serve, fill it out and send it to headquarters.

DRIVERS and mechanics are wanted for early service overseas. The men in the front line trench need the help and co-operation of skilled men back of the lines, and motor experts are wanted at once for the Enlisted Ordnance Corps, National Army. Uncle Sam is calling on us to come across and help his fighting men. There is a lot of work to be done over there, and the call has gone out for mechanics and chauffeurs between the ages of eighteen and forty.



by Fred Stuetz
with apologies to
William Cullen Bryant

To him, who in the love of motoring holds Communion with her visible forms, you speak
A various language. With a mighty pull,
You climb the steepest grades on high, and bring us Far above the valley; and make a tryst With the silver clouds and the eagles' nest. The soaring fowl are your boon companions And playmates, with whom, side by side, you Glide to the lower earth again, to choose Anew, your friendships among the motley crowds That throng the earth afoot, or swiftly, Move in thy realms of speed. Thou art a friend. Like a true friend, ever ready art thou To serve with thy might and speed to all Who are in need. Food for the hungry. For the Injured, sick and needy, aid. Happiness For the unhappy. Thy mission here Is worthy, noble, beautiful; all that Kings or common people would dare to ask. Nor dost thou ask for aught than direst needs-Gas, oil and water thine only nourishment. When thou first was born to this world, thou wert Come as a stranger, unwelcomed and unwanted, But evolution, with eager, grasping hand Stretched forth to meet you, opened wide the road To Thou, the survival of the fittest, and Closed it to the horse. Thou will stay for a space. For that which you surplant, we will not grieve,
For a better friend needs but ask to come
To take the place of a less worthy one.
To thee, until thy summons comes to join
The ruthless, irresistible process Of evolution, and thou wilt forever Join thy weaker brother, the horse. Let us Now place thy laurels, where thou canst believe, In our unfaltering trust, so thou Canst later, lie down to pleasant dreams.

#### How Is the Motor Car Business?

#### Summary of Situation Shows Increasing Driveaways and Better Retail Sales

ETROIT, Dec. 7—The number of driveaways are increasing, due to the freight car shortage. None of the manufacturers is proud of the fact or likes to admit it, because they feel that the cars so delivered are under a shadow, especially when driven to points as far away as Des Moines, Omaha or the eastern coast. But it is a war necessity and for the present is about the only relief from the tied up traffic conditions.

The Buick now is driving away about 4000 cars monthly, at the rate of 150 per day. Most of these are being driven to neighboring points for shipment. For example, before the lake routes closed, cars were driven to Detroit. At present those going to Oklahoma and western points are driven to Alma, Mich., for shipment. Those going through Ohio and to mid-western parts are driven to Cincinnati. To a certain extent flat cars are aiding shipment, as they are available. Buick expects to continue driveaways until the middle of January, when snow will prevent them.

Briscoe formerly was driving away about 100 cars per week and now is driving away about twenty-five. Though most of these go to nearby points, many have gone as far as Pittsburgh, Pa., and Jacksonville, Fla. Oakland is driving away in about the same proportion, a recent drive consisting of eighty-six cars for Atlanta, Ga. This company was fortunate in obtaining fifty new freight cars for shipment of an assignment to Seattle, which will be sent in one week, and also in obtaining a circus train for southwestern shipments.

#### Embargoes Affect Shipments

Reo reports that embargoes and car shortage have made shipments bad and that at present about twenty-five cars a day are being driven away. These go to Indiana, West Pennsylvania, New York, Southern Illinois, Indiana and Wisconsin, and some to Iowa. The Dayton, Ohio, dealer states he can beat the railroad time each way, driving to the factory, getting the cars and driving back. On a carload shipment he can save \$8 a car by this method.

The expense of a driveaway, as compared to freight car shipment, depends, of course, upon the distance and the road conditions. Dodge Brothers dealers in Iowa and Nebraska claim they can driveaway at from \$5 to \$10 more than freight rates, were freight cars available. While there is a slight prejudice on the part of the buying public against cars thus delivered, it must be realized that it is about the only method of getting cars at all and that cars so delivered are not harmed but improved, if the driveaway is carefully made. The present trend indicates that with better roads and increased freight traffic driveaways will be the rule rather than the exception next summer.

The Government already is planning to do that with its war trucks, and truck makers are loading one truck on another and delivering overland.

Reports filed with the police department show that in spite of the great exodus from the city caused by enlistment in Government service, and the movement of entire families, more families are coming into the city than are leaving. This is in direct contradiction to reports going through the country, stating that many houses are now empty, due to laying off men in the factories, as contrasted with the house shortage of last spring. The factories are not laying off men, that is, skilled men. A premium is placed on skilled mechanics, cost study men and timekeepers. The turnover in unskilled labor is somewhat higher, due to the fact that factories are getting on a war basis. But that is all.

#### Draft Takes Thousands

Many houses are available. That is explained by the fact that families are now doubling up and making one house do for two. The draft and enlistment have taken thousands of men, men who were running their own houses, and the families they supported have joined relatives in the city or elsewhere. Building has decreased, but more because banks are not financing real estate so freely as formerly, because money is tighter or being directed in other directions. But all signs point to the greatest industrial activity the city has ever seen, because of the large war orders, and because of the fact that the motor car industry is not to be seriously curtailed.

There has been considerable uneasiness over the action of several motor companies in holding up or decreasing certain dividends, but a little consideration of the conditions will indeate this to be an entirely natural action. At the present time every manufacturer requires a larger amount of cash on which to carry on his business—first because more is needed and secondly because money cannot be obtained as easily from the banks. Besides capital is needed to finance war work.

There has been considerable uneasiness about the ability of the car manufacturer to get material for the coming year's production, and the one that was the uneasiest was the manufacturer himself. Hence, iron-clad contracts were made with the sources of supply, and now the materials are coming in in great quantities. Almost every company is carrying an inventory investment far above that of last year, which in turn has eaten into the surplus and rendered the retention of dividends wise.

The recent report of the Reo Motor Co. is an example of the increase in inventory and decrease in surplus. Dodge Brothers are reported to have material for over a year's constant production at maximum capacity, and Chalmers to have \$6,000,000 worth of material on hand. Others are likewise carrying large inventories. In view of these conditions, conservatism is advisable, and not necessarily an indication of weakness.

The Willys-Overland Co. reports twice as many sales for November as in No-

vember, 1916. The Cadillac Motor Co. states that out of a representative list of owners having previously owned Cadillacs, 37 per cent changed this season from open to inclosed cars. Buick, Olds, Reo, Oakland, Liberty, and, in fact, practically all manufacturers report good business.

The South is buying cars, and the manufacturers are using every effort to sell them there. One day this week representatives from thirteen manufacturers were in New Orleans at one time, and nearly every factory reports active sales promotion work.

During the last two weeks retail car sales have picked up-for those dealers that have gone out to get it. It is not normal yet, but up and down the row those dealers that have been plugging are beginning to get results. The L. J. Robinson Co. has found that the war has completely upset the prospect field and necessitated a complete change in the selling methods. A house-to-house canvass was made of the various districts, and this proved, first, that the rich, or so-called well-to-do class, are not buying cars. These people have their money tied up for the present, at least, and are making their old car do. But it showed that those people that last year could not afford cars now can, and are buying them.

In this class are the mechanics and small retailers. The mechanics are getting good wages, and the retailers are getting the benefits from the present high prices. For example, the canvass showed that out of ten second-hand clothes dealers on one street, nine owned cars, and none of them cost less than \$1,000. Several cars were sold to men that could not make out their own checks.

#### Used Car Sales Slow

The second-hand car sales are, however, very slow, and many are holding them until the spring for a hoped increase in prices.

War conditions have made the sedan a more popular selling car than the limousine, according to statements from New York dealers. Sedans are in demand but it is not so easy to get rid of limousines. Many owners have disposed of their chauffeurs as economy measures and are driving their own cars. Some of the dealers have quite lengthy lists of chauffeurs who desire employment, and it is said that the lists are growing longer daily.

#### DETROIT STARTER NOW VERSAL

Detroit, Dec. 10—The Detroit Starter Co. has changed its name to the Versal Products Co. along with general expansion during which it has increased its factory facilities more than 100 per cent. For some time the company has made no starters but has produced various devices under the trade name of Versal.

#### TALK TRACTOR CONTEST RULES

Minneapolis, Minn., Dec. 7—Rules for tractor contests were discussed in an informal way at the meeting at S. A. E. headquarters last night. It has been proposed that the S. A. E. should formulate a set of rules for tractor tests along the same line as its regulations for official fuel economy and acceleration tests, but to judge from the discussion last evening the consummation of this plan is still a long way off. On the occasion of a previous

meeting of the Minneapolis section for the same purpose a general invitation was sent out to all local tractor makers to attend, and it developed that there were about as many different opinions as to what a practical tractor contest should be as there were tractor men present, with the result that it was impossible to get anywhere. The meeting this evening, therefore, was limited to members of the sub-committee on test regulations and one or two others.

#### MORE SHOW SPACE SOLD

New York, Dec. 7—One more car exhibitor, Templar Motor Corp., Cleveland, Ohio, and the following accessory exhibitors have been added to the lists for the New York and Chicago shows:

#### New York Only

Eisemann Magneto Co Brooklyn, N. Y.
Fryer-Auster Co
Kales Stamping Co Detroit
Le Compte Co., Geo. W
Otis Elevator CoNew York
Peters & Herron Dash Co Columbus, Ohio
Philadelphia Storage Battery Co
Philadelphia, Pa.
Rives Never-Slip Auto Pedal Co New York

Philadelphia, Pa.
Rives Never-Slip Auto Pedal Co New York
Simmons Mfg. CoCleveland, Ohio.
Sales Service Co
Titeflex Metal Hose CorpNew York
Tri-Ton Trailer CorpNew York
Union Truck Mfg. Co., Inc New York
Adams & Elting CoChicago
Art Metal WorksNewark, N. J.
Auto Pedal Pump Sales Corp New York
Edward G. Budd Mfg. Co Philadelphia, Pa.
Carburetor Mantle CoNew York
Coffield Tire Protector Co New York

#### Chicago Only

Air Device Co	
Gibralta Jack Co	New York
Globe Mfg. CoBattle	e Creek, Mich.
McKinnon Dash Co	
Syracuse Universal Mfg. Co., Inc.	
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#### MAXWELL IN DURABILITY RUN

Detroit, Dec. 10—A Maxwell 1-ton truck is making a durability drive from New York to the southern army camps and back under official sanction of the American Automobile Association. It left New York Nov. 30 with a load of 1 ton and an itinerary of 2500 miles outlined. A running schedule of 15 m.p.h. has been fixed, and accurate figures will be kept on the gasoline economy, lubricant consumption, water and so on by the A. A. A. observer.

#### G. M. OPENING MARQUETTE PLANT

Saginaw, Mich., Dec. 7—The General Motors Co. will open the Marquette plant in this city and start operations about Jan. 1, employing between 1000 and 1200 men. George H. Hannum, general manager of the Jackson-Church-Wilcox Co., manufacturers of the Jacox steering gears, will be in charge. This plant originally was constructed for the Ranier Motor Co., was taken over by the General Motors Co., and the Marquette Buick manufactured in it for some time.

#### Court Blocks River Rouge Plan

#### Ford Motor Co. Ordered to Distribute \$19,275,385 and Pay Back Money Spent

DETROIT, Dec. 7—The court has blocked the River Rouge plan of the Ford Motor Co. to establish extensive blast furnaces and ordered the distribution within thirty days of a dividend of \$19,275,385. This is the final decree in the Dodge-Ford suit in which Dodge brothers asked for a division of profits instead of diverting them for construction of the furnaces on the River Rouge. The original decree stated that half the accumulated profits of the Ford company on hand July 31, 1916, after the deduction of special dividends declared then, should be distributed to stockholders.

The Ford Motor Co., through its attorneys, has appealed to the state supreme court from the decision, which was handed down by Circuit Judge Hosmer.

In the decision it further is held that the Ford Motor Co. may not accumulate profits "in excess of such as may be reasonably required in the conduct of the business" hereafter. Although the River Rouge project is blocked insofar as the Ford Motor Co. is concerned, it is believed Henry Ford himself will carry it on. In the meantime the Ford Co. must refund all money so far expended on it in addition to distributing the dividends. The money spent must be refunded within ninety days. The costs of the suit have been taxed against the individual defendants, Henry Ford, Edsel B. Ford, Frank L. Klingen-smith and Horace M. Rackham and not against the Ford company.

#### U. S. HIGHWAY OFFICIALS MEET

Richmond, W. Va., Dec. 8—The American Association of State Highway Officials closed their annual meeting here today particularly cheerful because of the message conveyed from Judge Lovett of the Priorities Board of the Council of National Defense by Roy Chapin, chairman of the Highway Transportation Committee, to the effect that Priority Order No. 2 prohibiting the use of open-top freight cars for hauling gravel will be rescinded by early spring from present indications.

The meeting was attended by representatives of thirty-seven states and by fifteen members of the Office of Public

Roads. Mr. Chapin informed the members present of the plans and duties of the Highway Transportation Committee and also discussed the importance of military highways during the war. He said that at this time it appeared that roads throughout the country would require the same care as railroads; that state road officials should plan the same treatment as the railroads that constantly change rails, clear tracks and keep up energetic maintenance.

#### RECEIVER FOR MARION-HANDLEY

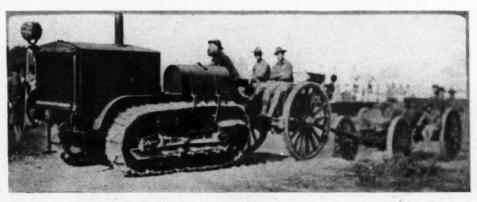
Detroit, Dec. 7—The Mutual Motors Co. of Jackson, Mich., manufacturer of the Marion-Handley, is now in the hands of receivers. The Detroit Trust Co. has been appointed receiver in bankruptcy. Some months ago this company was formed by the consolidation of the Marion Co. of Indianapolis and the Imperial Co. of Jackson. About a month ago the plant was shut down for an inventory.

#### DETROIT GAUGE GETS DECISION

Detroit, Dec. 7—The Detroit Gauge & Metal Stamping Co. has received a decision granted in the United States court at La Crosse, Wis., against the National Gauge & Equipment Co. of that city. The Detroit company manufactures the Retlaw gasoline and oil gauges, and the suit was made on patent infringement grounds. The National Gauge & Equipment Co. has filed a bond covering damages, pending action on appeal and final disposal of the suit in the United States court of appeals.

#### WOULD CONCENTRATE ON ROADS

Washington, Dec. 10—Comparatively unnecessary roads will be eliminated from next year's construction and effective guarantees will be obtained for those which are most necessary if the state highway departments adopt the policy outlined in a letter being sent out by Director Logan W. Page of the Office of Public Roads, emphasizing the need of such in this time of war stress. Road construction has been hampered seriously by excessive costs, scarcity of labor and inadequate transpor-



Motor-drawn batteries are used by the marines. This is one of the tractor-drawn batteries with our boys in training camps

tation facilities, and such a situation, while critical even in normal times, is a matter of vital importance when the public roads must be depended on to relieve the tremendous strain on the railways in addition to taking care of normal traffic.

The policy proposed by Director Page, and on which he requests opinions from state highway men throughout the country, follows:

The selective consideration of all of next year's construction jobs in all of the states and the preparation of a program of road work throughout the Nation, in which program each construction job would be listed in the order of its economic importance to the particular territory in which it is located and to the nation as a whole.

A co-ordination of this selective process with the railway and water transportation facilities with a view to insuring an adequate number of cars and vessels of suitable types, with proper distribution to transport materials for the construction of the approved jobs.

A co-ordination with the materials industries with a view to insuring supplies of materials in adequate amount, distribution and deliveries to permit the construction program to be consided out

#### Launches Mail by Motor

Postoffice Puts in Operation Service by Trucks Between Capital and Baltimore

City Buyers Closer to Farmers by New Movement

Washington, Dec. 10—Special telegram—The Postoffice Department today put into operation the first motor mail route between big cities, when it established the service between Washington and Baltimore. The motor trucks leave Washington and Baltimore, respectively, at 6 o'clock in the morning, meet about 3 hr. later midway between the two cities, exchange their mail and return to the station points by 2 o'clock in the afternoon.

The early afternoon arrival at the starting points permits mail to be delivered

in the terminal cities that afternoon; it permits orders for country produce to be sent out in the morning, delivered en route to farmers along the way, and the orders, filled, mailed back by parcels post on the return trip. Thus, urban buyers of country produce, for instance, are able to receive it on the afternoon of the day on which the order is sent and received by the farmer.

Other routes between large cities are to be established as soon as it is possible to arrange for them.

#### RUBBER MEN AT CAPITAL

Washington, Dec. 7-A special committee of the Rubber Association of America met here this week "to study and determine how the association can best assist the Government in the war, particularly how to bring about the construction and the utilization of aircraft in overwhelming numbers at the earliest possible date.' This resolution creating the committee was passed Nov. 17-18 by the rubber people at a meeting in Akron. The committee consists of Edgar B. Davis, Harvey S. Firestone, Paul Litchfield, Charles B. Raymond, George B. Hodgman, C. T. Wilson, Harry T. Dunn and H. S. Voorhees, secretary of the rubber association, which consists of 330 members.

#### EDGAR APPERSON NOW MANAGER

Kokomo, Ind., Dec. 8—Edgar Apperson has become general manager of the Apperson Brothers' Automobile Co., succeeding Elmer Apperson, who has retired from active participation in the business because of ill health. It was Edgar Apperson who won the first speed contest held in the east, in 1897, and who completed two years later the first long overland trip made by an American car—a run from Kokomo to New York, about 900 miles.

#### TO CO-ORDINATE TRANSPORT

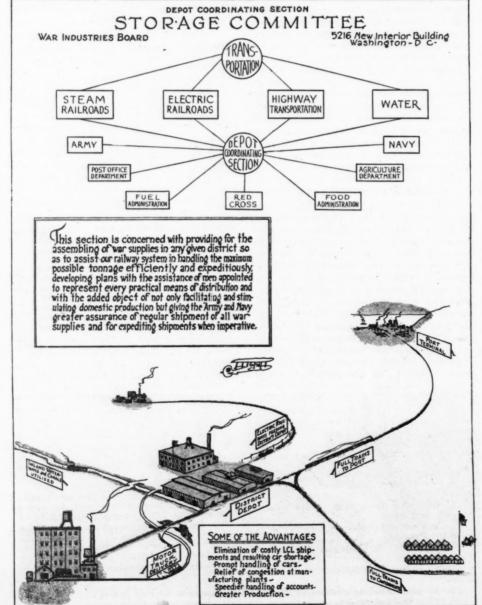
Washington, Dec. 8—The depot co-ordinating section of the Storage Committee has arranged a definite working agreement that promises complete co-ordination between the committees on steam railroads, electric railways, highway transportation and water. These will co-operate and co-ordinate all freight-carrying facilities to handle the supplies for the many varied departments of the Government including Army, Postoffice, Navy, Agriculture, Food, Fuel and Red Cross. The chart shows the many advantages that will accrue from this arrangement.

#### CLERC OF PEUGEOT HERE

New York, Dec. 7—France is preparing to meet a demand for many tractors after the war, according to Adrien Clerc, production manager of the French firm of Peugeot, who is in this country to study tractors and production methods. France is a particularly difficult country in which to sell tractors because the land is divided into innumerable minute farms, often of peculiar shape, and each small land owner is so poor frequently he and his family do all the tilling of their soil.

In the war area, where all landmarks have been swept away, it will be impossible to re-establish the small holdings in the same shape they were before. Every woods

#### War-Time Transportation Co-ordinated



and every building has been swept away, and nobody could lay out the land again as it was before. Therefore, farming will have to be started on a large scale by some government or community system and the land will be laid out on more economical lines, giving the tractor a chance to work efficiently. Such a reorganization might be followed by community farming in other parts in France, in which the tractor could be used to great advantage; in fact, it is considered certain that French agricultural methods must be improved to meet the needs of after-war conditions.

Mr. Clerc will visit the principal tractor plants in the Middle West and also examine American methods of drop forging. His company now employs 26,000 workers and has expanded enormously during the last three years. It is making motor cars, trucks, airplane engines and munitions for the French army.

#### TO PICK SIGNAL CORPS MEN

Washington, Dec. 8-Every national guard and national army camp will be visited this month by medical officers to examine men for service in the aviation section of the Signal Corps. Surgeons were assigned to this work today by the War Department. It is expected that there will soon be a surplus of men in each cantonment and camp over the required numbers to compose the divisions to be formed, and these men that are especially adapted for flying or mechanical duties will be selected for such work. The men selected will be sent to Signal Corps training schools for intensive training before their dispatch to France.

#### GOODYEAR BUSINESS \$111,000,000

Akron, Ohio, Dec. 10-Goodyear business during the last year jumped from \$63,000,000 to \$111,000,000 and net profits from \$7,003,330.09 to \$14,044,206.10, an increase of 74 per cent in business and 100 per cent in profits. Less than 1 per cent of the business, moreover, is contributed to direct war business.

Plant extensions under construction at the beginning of the year have been completed, nearly doubling the capacity. During the year the company increased its capital by the sale of \$7,500,000 preferred and \$3,372,000 common stock. The earnings for the last year, subject to deduction for Federal tax, show 611/2 per cent for the common stock, the highest record made by Goodyear. But one change has been made in the officers. W. E. Palmer succeeds F. H. Adams as treasurer through Mr. Adams' resignation from office.

#### \$59,100 FOR PATHFINDER

Indianapolis, Ind., Dec. 7-The highest bid for the plant of the Pathfinder Motor Car Co., which was offered for sale by the receiver, was \$59,100, submitted by L. Goldstein Sons of Philadelphia. Officials of the American Motor Parts Co. here state the company is a part of L. Goldstein Sons and the Pathfinder plant probably will be used in the work of the American Motor Parts Co., though representatives of the Philadelphia concern have not authorized such announcement so far.

#### Guide for Truck Makers

#### Military Board Issues Regulations to Plants with Class B Assembly Contracts

#### Manufacture to Proceed Under Government Inspection

WASHINGTON, Dec. 8—The Military Truck Production Board, in conjunction with letting of assembly contracts for the class B trucks, has issued the following specifications to winners of the contracts:

1—Design—All trucks and parts thereof furnished under these specifications shall be manufactured to drawings and parts lists furnished by the Military Truck Production Board, Q. M. C.

2-Material-All material must be as speci-2—Material—All material must be as speci-fled on the drawings unless special permission for substitution has been granted by the Super-visor of Inspection, M. T. P. S. 3—In no instance will permission be granted

for substitution of an inferior grade of material unless authorized by a change of the draw-

4—Wherever it is impossible to define the quality or properties of material on the drawing or in specifications the purveyor shall sub-mit samples for the approval of the supervisor

of inspection.
5-Not only must all materials conform to

5—Not only must all materials conform to the drawing in respect to chemical analysis and physical properties, but must be of uniform quality and free from defect. 6—Forgings—All forgings shall be free from injurious imperfections such as excessive die shifts, scale, fins, cold shuts, pock mark, etc. Forgings shall not be painted before inspection Government inspector.

7—Castings—All castings shall be free from etc. Core holes shall be thoroughly cleansed of sand, chips, nails, etc. Castings shall not be painted before inspection by Government in-

8-Stampings-All stamping and pressed steel parts must be free from corner cracks, splits, brittle spots, etc. Stampings shall not be painted before inspection by Government in-

9—Workmanship—All workmanship must be strictly first-class, all machining, heat-treating, assembling, painting, etc., to be done thor-

oughly.

10—Machining—All machining must be to limits specified on drawings. It is not intended to hold unnecessarily close limits but in no instance will permission be granted for a departure of the state of the ture that would destroy interchangeability.

11—The finish must be as specified on the

drawing.

12-All threads must fit without shake. All

threads must be cut according to tolerance and limits specified by supervisor of inspection. Not more than three threads shall protrude after nut is tightened down to final seat.

13-Exposed corners shall be broken.

14-No welding shall be done after machining. No welding shall be done on highly stressed parts where strength is liable to be impaired thereby.

15—Soldering of aluminum parts permitted after machining if strength will not be impaired thereby.

16—Heat Treatment—All heat treatment to be thoroughly done and checked by frequent

17—Samples of each heat to be tested to ascertain if required properties are being obtained.

18-Heat treating furnaces should maintain an even temperature.

19-The pyrometer equipment should be frequently calibrated.

20-Assembling-All assembly must be carefully done. 21-No careless or makeshift work will be

22-All parts must be cleansed of dirt and chips before being assembled.

23-All nuts must be drawn tight without

stretching bolt or injuring thread.

24—All cap screws must be drawn tight without stretching or injuring thread.

25—All cotter pins must be in place and properly spread.
26—All lock wires and lock washers must be

in place.
27—Where hot riveting is specified it must be done at proper heat and heads must be perfectly formed.

28—Tests—The purveyor will be called upon to make such tests of finished product as may be necessary to insure free operation and proper performance of function for which part is in-

tended.

29—The purveyor will be called upon to make such physical and chemical tests as will insure adherence to requirements of drawings and proper performance of function of the part.

30—Inspection—The production of the standardized military trucks for the U. S. Government and all parts thereof shall be open to inspection by officers of the U. S. Army assigned to purveyor's plant for that purpose.

31—Such officers shall have free access at all time to all parts of the purveyor's works in

time to all parts of the purveyor's works in which any work is under way in connection with any parts furnished under these specifica-tions. Such parts in detail and under such process of manufacture shall be subject at all

times to approval of inspectors.

32—Communications between purveyor and department shall pass through hands of inspector stationed at purveyor's plant.

33-Purveyor must provide suitable quarters with necessary desks and equipment for inspectors and stenographic aid if found necessary.

34—Purveyor will give access to all gages, tools and testing machines necessary to the proper conduct of the inspection work.

35—All necessary working gages, templets, etc., to be furnished by purveyor.

36—Purveyor will furnish chief inspector a list of sub-purveyors together with quantity of

list of sub-purveyors together with quantity of material ordered from each.

#### Access for Inspector

37-Inspector shall have access to all work in process in sub-purveyor plants.

38—Purveyor will furnish inspector reports of all tests that purveyor or sub-purveyor may make on material or parts entering into trucks.

39—Purveyor's employees will not interfere with progress of inspection, but must co-operate with inspector in every possible way.

40—All parts will be inspected without unnecessary delay and if found to be in all respects as required by specifications shall be received and become property of the U.S.

41-Any parts not conforming to specification requirements in material or workmanship may be rejected by inspector at any stage of process of manufacture.

42—Inspector may upon verbal notice suspend work on any part if in his estimation purveyor is not complying with specifications. In-spector will at once communicate with his superior and obtain quick decision on matter.

43—Contractor shall not continue production of parts in question except at his own risk without approval and consent of inspector. spector will not give approval and consent until satisfied that purveyor does and will continue to comply with specifications.

44-Purveyors will equip themselves with such working and inspection gages as are nec-essary. Gages will be checked either by Bureau of Standards or by inspector with standard gages furnished by inspection department, at discretion of the inspector.

45—The purveyor will notify the inspector at his plant when such tests as inspector desires are to take place. This notice shall be given in advance that inspector may personally witness such tests. Purveyor will make sys-tematic report as to progress of all work in his plant which concerns inspector.

46—Purveyor will provide necessary labor or materials in connection with inspection such as crating or uncrating of gages, instruments, etc.

47-Purveyor must have Government inspector pass on no less than 10 per cent of finished parts or units before proceeding into the next

48-Marking-Purveyors shall mark visibly such parts as inspector shall designate with identification mark assigned by supervisor of inspection as well as with the part numbers of

#### Our Own Air Route in Operation

#### Student Aviators Have Definite Path for Day and Night Practice in Flying

WHILE enthusiasts have been busy mapping out projected transcontinental airways for cross-country, ocean-to-ocean flights sometime in the future, there has been actually put into operation a definite route which now is marked for daytime flying and partially marked for night flying. The air route between the flying field at Dayton, Ohio, and the field at Rantoul, Ill., has now been well defined, under the direction of Carl G. Fisher of Indianapolis, a member of the mapping committee of the National Advisory Committee on Aeronautics. Its purpose is to aid in the training of aviators for service in France and is designed for student aviators.

If our aviators are to be of the greatest value on the other side they must become accustomed to night flying; they should be able to feel and to understand all the conditions of night flying in this country. This requires a system of night markers so that an aviator may become accustomed to judging his course and location from the heavens, the winds and the driftage and continually check himself with the markers until he becomes an expert.

At first thought, it might be believed that an aviator could leave some point, as Dayton, Ohio, with a compass and hang his mark on the outstretched arm of the statute of Indiana in the center of Indianapolis without trouble. This is not the case. Wind driftage is a big factor, and even the expert flyers in France sometimes get way off their course even though provided with compasses and other mechanical means for guidance.

#### 100 Barns Marked

The work of marking the route between the two flying fields of Dayton, Ohio, and Rantoul, Ill., was commenced last summer, and about 100 barns along the national road and the main connecting road between Indianapolis and Rantoul were marked. Each barn carried a large number on its roof with an arrow pointing to the most desirable landing field for emergency. The use of these landing fields was donated by farmers along the route. Student aviators have found this daylight marking of great assistance in going back and forth.

Taking the Indianapolis Motor Speedway as a central point landing field large numbers, from one to seventy-two, were painted on the barn roofs between the speedway and Dayton, Ohio, at an average distance of 2 miles apart. From the speedway to Rantoul, Ill., the field numbers run from one to twenty-eight with an interval of about 4 miles between marks. This comprises the daylight portion of the route marking.

To define the route for night flights is a larger undertaking. This is well under way, and a great many of the towns along the route have their equipment installed so that when notice is given of a night flight flood lights show the way from town to the next. These installations have in

CHAMPAIGN PA PAXTON DANVILLE CHRISMAN C MONTEZUMACE VEEDERSBUR COCKVILLE OF AYNETOWN CRAWFORDSVILLE LAFAVETTE GREENCASTLE NEW ROSS MESTOWN **TRANKTORT** BROWNSRURG LANDING FIELD DIANAPOLIS NOBLESVILLE FT HARRISON FRANKLIN CUMBERLAND GREENFIELD PENDLETON SCHELBYVILLE MORRISTOW) KNIGHTSTOWN ONEWCASTLE -RUSHVILLE LEWISVILLE AMBRIDGE CITY CONNERSVILLE C WINCHESTER MCHMOND LIBERTY C GREENVILLE CAMDENCE BEATON MIDDLETOWN LANDING FIELD TOM

Route and markings of the air route from Rantoul, Ill., to Dayton, Ohio, used by U. S. A. aviation students

every instance been donated by the towns through their patriotic spirit, and private citizens and town authorities and civic organizations are erecting and maintaining a signal-lighting equipment. Among these towns are Dayton, Fairfield, Wright flying field near Dayton, Eaton, Ohio, Richmond, Cambridge City, Knightstown, Greenfield, Cumberland, Fort Harrison, Indianapolis, Indianapolis Motor Speedway Landing Field, Brownsburg, Jamestown, Crawfordsville, Waynetown, Veedersburg and Covington, Ind., Danville and Champaign, Ill., the latter city being only 10 miles south of the Government training field at Rantoul, Ill.

Signal equipment consists of four or six light projectors with colored lenses, equipped with lamps of 200-watt capacity. For indicating the direct flying route from the Dayton flying fields to the Rantoul field, lights flash on and off at intervals. To assist the pilot to check his location, the station at the end of the first 50 miles west of Dayton flashes different colors alternately. The completion of the second 50-mile leg is indicated by the rapid flashing signal for the Indianapolis motor speedway landing field. Continuing west, the third checking signal consists of six colored lights flashing on and off, indicating Crawfordsville, Ind. Again at Danville, Ill., the light flashes another color at intervals. All other units which indicate to the pilot or his observer that they are following the direct course employ special color lights flashing on and off. Flood Lights

The scheme of lighting air routes consists of special flood lights at landing stations, and at towns on the route between landing stations are flashing signals of special colors which show the aviator he is on the route. These are so arranged that the aviator is never out of sight of a route light, if he is on the route. To prevent his getting too far off the route other signals are being established at towns 20 miles on either side of the main route, and these signals are so arranged that he can tell from their color which direction he should turn to get back on the route.

It is not too much to prophesy that before a great many years the country will be criss-crossed with main air lanes whose paths are marked by brilliant signals to guide the aerial traveler across the continent by night or day.

#### HELLEN RESIGNS FROM DART

Waterloo, Iowa, Dec. 8—C. W. Hellen, for five years president and general manager of the Dart Motor Truck Co., has sold his interests and will retire. He will be succeeded as president and general manager by H. H. Henry, formerly with the Maxfer Truck Co. It is said that change in management forecasts a general reorganization of the Dart Co.

#### NEW ENEMY AIRCRAFT NOTED

The Germans are using a type D3 Albatross engined with a 170-hp. Benz as a fighting scout mainly, according to Aeronautics of London. The best flying speed is about 125 m.p.h. and climb 20,000 ft. in 22 min.

A 200-hp. Benz-Albatross will be out soon. Meanwhile, a reliable French source has it that all is not well with the twin-engined Gotha. Its performance is good—a ceiling of 20,000 ft. with fuel for 5 hr. and getting on for ½-ton bombs—but the landing speed is most indifferent and is said to have caused numerous accidents.

The bombing airplanes Germany has sent to raid England recently appear to be Gotha machines of a new type. They are said to be equipped with four Mercedes engines of 260 hp. each and carry fuel for 10 hr. The crew of each is made up of five men—two pilots, two gunners and a captain, who controls the radio apparatus.

#### PETROMORTIS TAKES NAT WILLS

New York, Dec. 10—Nat Wills, the hobo comedian, died yesterday while working on his car in the garage at his home at Woodcliff, N. J. The garage is small with no ventilation except when the door is open, and the door had been locked to keep it shut. Petromortis, to which his death was due, is caused by the fumes coming from the exhaust of a car, which are fatal in a poorly ventilated inclosure.

#### MEXICO SPEEDS UP ROADS

Dallas, Tex., Dec. 10—The project department of communications and public works of Mexico for the construction of roads suitable for motor cars in all portions is being received with enthusiasm, according to official statement. One of the first roads to be built will connect Mexico City with Juarez and El Paso, a distance of over 12,000 miles.

Every state in Mexico will co-operate. Motor car lines connecting Guadalajara with Tepic, capital of the state of Nayarit, and also with resorts on Lake Chapala, are being inaugurated. Heretofore it has been necessary to rely upon the stage coach for such journeys.

The extent of the use of motor cars in Mexico City is indicated by a statement to the effect that there are now in operation there a total of 2165 cars, of which 1329 are private property and the remainder for public use.

#### STATE MOTOR LAW FIRST

Milwaukee, Wis., Dec. 10—The Supreme Court of Wisconsin has upheld the principle of the state law regulating the use of motor vehicles, which prohibits municipalities or other local lawmaking bodies from enforcing any restrictions not conforming to the requirements of the state motor code, by handing down an opinion against Baraboo, Wis., and in favor of Emmett Dwyer, who was fined \$10 and costs under a local ordinance for exceeding the speed limit while crossing a bridge in his car.

The state motor code prescribes a maximum speed of 15 m.p.h. for motor vehicles while being driven upon or along any public street, highway or bridge. Baraboo, however, has had in effect for a long time a local ordinance fixing a limit of 10 m.p.h. for bridges. When Mr. Dwyer's case was heard in the police court at Baraboo, he was found guilty under the local ordinance and fined \$10 and costs. He appealed the case to the Circuit Court, which reversed the decision of the police court. The common council of Baraboo then directed the city attorney to make an appeal to the Supreme Court, which now upholds the state law.

#### Post Office Will Use Invalided Planes

#### Machines Out of Date for War Purposes Will Help Inaugurate Aerial Mails

HICAGO, Dec. 10-With an aerial route in operation, as described in this issue, and the Postoffice Department planning to use invalided war planes for mail transportation, it looks as if the results of the vast expansion of the airplane industry brought on by the world war will be realized, partly at least, before peace even. The Postoffice Department soon will begin mapping out aerial mail routes in preparation for spending that \$100,000 Congress appropriated for experiment with aerial delivery. No planes actually in service will be used, but many planes originally constructed for the Army are going out of date for military service, and it is probable that they will be used by the department and thousands of dollars thus saved.

Meanwhile, the first machine-made Liberty aviation engine has been completed, and delivery of a lot is promised for this month. American aviators are in training in Europe, and members of the air board, who made an inspection trip recently to plants and flying fields, are confident that in another sixty days men and machines will be coming through at a rate fast enough to insure ultimate success of their plans.

A large class ready for preliminary flying work is being turned out by the ground schools each week. About a fifth of the men admitted to the ground schools fail to complete the strict course of general instruction required, and some must drop out, but the trainings of aviators and observers and thousands of mechanics to keep the flyers in the air is going on steadily, here and abroad.

Major J. G. Vincent, formerly chief engineer of Packard, now in charge of airplane production, has qualified as an aviator at Dayton, Ohio, where, following continuous study, he made his first and succeeding flights with his own machine, successfully.

The Grand Rapids Airplane Co. has been organized with a capital of \$200,000 by furniture manufacturers of Grand Rapids, Mich. It is expected that practically all the furniture factories in the city will receive orders on the parts entering into the airplane construction. Work will be started as soon as material is available. The following are the officers of the company: President, Samuel D. Young; vice-president, F. S. Foote; treasurer, J. H. Hoult; secretary, C. C. Kustere.

#### BRITISH COLUMBIA BUYS CARS

Vancouver, Canada, Dec. 7—During the month of September 275 cars were delivered to British Columbia buyers in which Ford and Chevrolet had the list in numbers; the higher-priced cars such as the Studebaker, McLaughlin and Willys-Overland coming next.

British Columbia is a fertile field for the motor car dealer and though 1400 cars have been sold since the beginning of June, the approach of winter is having but lit-

til effect upon sales. The chief difficulty is tnat of obtaining deliveries on cars, as the war has made it very difficult to obtain these western shipments.

Dealers have to face another difficulty as a marked increase over the American price is necessary in the prices here. For example, the Hupmobile selling for \$1,385 f. o. b. Detroit is \$1,750 f. o. b. Vancouver and the prices of other cars coming from the states are increased in the same ratio.

Commercial car sales have increased greatly in the last summer, and many dealers are handling trucks in addition to passenger cars. These run from the light delivery to the heavy 3- and 5-ton trucks, while truck-attachment sales also find a ready market.

#### 7000 CARS STOLEN IN MICHIGAN

Lansing, Mich., Dec. 7—In spite of the fact that the last legislature made motor car stealing a felony with a maximum sentence of a \$1,000 fine or five years' imprisonment or both, the number of cars stolen in the last year has increased. It is estimated that 7000 cars have been stolen in Michigan, a figure according to state officials low rather than high. Evidence indicates that the thieves are closely organized and according to insurance men rates will be increased unless a more drastic penalty is placed on car theft. It is possible that the next legislature will provide a minimum penalty whereby theft is punished by two years' imprisonment.

#### EXEMPTION MAY AID E. FORD

Dearborn, Mich., Dec. 7—Robert Ward Ford, a tool maker and machinist in the Henry Ford & Son tractor works, has been exempted from the draft on account of manufacturing necessity. Locally this is considered as favorable to the subsequent exemption of Edsel Ford, who was passed by the local boards and has appealed to the President for exemption. The local board claimed that Edsel Ford was not engaged in a necessary industry.

#### MITCHELL PASSES DIVIDEND

Racine, Wis., Dec. 7—The Mitchell Motors Co. has passed the usual quarterly dividends of \$1.50 a share. The company has a Government order for Four-Wheel-Drive trucks through the Four Wheel Drive Co., Clintonville, Wis., which has licensed it to take care of the contract, and substantial working capital is required. The suspension of the dividend was decided on to conserve the cash resources of the company.

Mitchell profits for the fiscal year ending Oct. 31 are estimated at between \$1,100,000 and \$1,200,000, or about \$9.50 a share. Production in that period was about 12,000 cars. This is as compared to \$1,188,398 profits and 11,000 cars in 1916.

#### Heater Insurance for Garages

Easy Starting and Better Engine Performance Induced by Devices for Car Houses

By B. M. Ikert Motor Age Editorial Staff

Successful winter driving demands heat in the garage. Not only is a warm garage inductive to easy starting and better engine performance generally, but it affords car insurance, in that it eliminates frozen radiators, reduces battery deterioration, saves bearings, owing to congealed oil, preserves the varnish on the body, and in other ways protects the whole mechanism.

By installing a heater the owner doubles the value of his garage.

Normally a garage protects the car only from rain, snow, sleet and theft, all of which can be accomplished with a canvas tarpaulin and good lock. But if a garage heater is added the car is protected against the ravages of frost and dampness.

Small garages can be heated by any one of the systems on the market which include the use of gas, oil or coal for fuel. There are also systems which connect the heating plant of the private home with the garage, using steam or hot water. Such installations are not always satisfactory, owing to the loss of heat to the ground. They are also expensive in first cost.

Scientific—The Scientific garage heater which uses gas for fuel consists of a sheet-metal heating drum of rectangular shape surrounded by a galvanized casing. Combustion takes place at one end of the heating drum in combustion chamber which is lined with cast-iron plates. After combustion the burned gases circulate through the heating drum and escape to the vent pipe, after all possible heat has been extracted. The casing is open at the bottom and the cold air on the floor is drawn into the space between the heating drum and casing where it is heated and passes out of the opening at the top.

#### No Matches Used

The gas valves are at the front of the heater and all air and gas adjustments are made from the front. In all cases a blue-flame burner is supplied, which burns natural gas, water gas, coal gas, or any mixture of them. Cast-iron legs and wall brackets hold the heater in place at the proper distance from the wall and above the floor, to insure safety and the most efficient heat circulation.

Matches are not used for lighting the burner, for there is a safety ignition device consisting of a rod projecting through the front casting and carrying a notched wheel of tempered steel on the inner end. Against this wheel is a piece of friction metal, held by a spring and adjusting screw. The outer end of the rod is knurled and the lighter operated by simply giving this knurled end a sharp twist. Adjacent to the notched wheel is a pilot light which catches the sparks given off by the friction metal. The main burner lights when the valve is turned on. Enough friction metal is furnished to last one or two years. These heaters are provided with a safety screen, which makes it impossible for gasoline fumes on the outside to be ignited by the heater. It is a higher development of the Humphrey Davey miner's lamp used where explosive gases abound.

The heat generated is controlled by a

Naturally the construction of garage heaters must be such that gases liable to collect on the garage floor cannot enter the heater and become ignited. The owner has nothing to fear so far as the fire insurance of his car is concerned, for nearly all of the modern heaters have the approval of insurance underwriters. The question of increased hazard applies only to the garage itself, because the policy protecting the car against fire places no restrictions as to the origin of the fire. But as a general thing it is well that the owner take the matter up with the agent who wrote the insurance, or the home office before installing a device.

Various types of heaters are described on the following pages, any one of which should meet with the individual requirements of owners. In all cases the garage should be wind-tight; garages made of sheet metal are difficult to heat, unless they are lined with plaster-board or something similar. Concrete garages require a little more heat than those of double wood construction. The following devices offer different means of providing heat within the garage:

thermostat, thus making the heater automatic in action. It is only necessary to set the dial of the thermostat to the desired temperature and no further attention is necessary. The heater is made in three sizes, one for garages having a floor space of about 360 sq. ft. at \$35, 540 sq. ft. \$40 and 900 sq. ft. at \$65. These heaters are made by the Scientific Heater Co., Cleveland, Ohio.

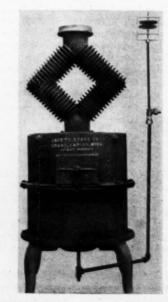
Wasco—The Wasco is a self-regulating hot-water system of heating for private garages with capacities of from one to ten cars. It is not connected to any water system, but filled once at the start of the cold season. Three sizes of heaters are furnished, according to the size of the equipment. The heater is made of cast iron and burns anthracite coal. In natural gas districts gas burners can be substituted, which owners must purchase locally. The water cylinder is cast in one piece and each heater is supplied with a brick ring

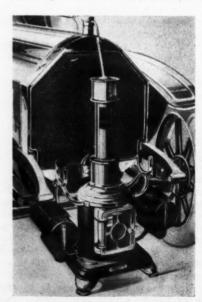
which prevents the ashes deadening the fire. The grate is sliding and slicing, operating on ball bearings. After the system is filled, oil is poured on top of the water to prevent evaporation.

#### Radiators Fasten to Wall

The radiators used with the Wasco system are fastened to the wall. A single radiator measures 1 ft. 1 in. by 7 ft. 3 in. This, with a heater standing 30 in. high fitted with standard pipe connections threaded and cut to fit, constitute the one-car Wasco system. The two-car system includes two such radiators; three-car system, three and so on up to the ten-car system which has ten. One such radiator is furnished for each car.

The radiators can be placed above one another; connected around corners; one radiator in the garage and in the chauffeur's room above or any other arrangement that local conditions may dictate. The loops of the radiator are built to





Wickless garage heater, left, and Neverout, which warms engine and garage

throw the heat out toward the car before it rises. Brackets are furnished for attaching the radiators. The hook bracket is placed under the radiator and the straight bracket centered directly behind the first opening from the top. The radiator is then fastened by drawing the head of the upper bracket tight with a screw.

Constant temperature is assured by an automatic regulator. The water in the bottom of the expansion tank expands and contracts as the weather changes. As the weather becomes colder the water in the bottom of the expansion tank contracts, which allows the float above it to descend. The float pulls down the regulator rod, which in turn raises the girdle damper in the top of the heater from the damper seat. This action opens the draft to the stovepipe and compels the fire to burn more briskly. When the temperature has increased to the desired degree, the fire is checked by the reverse action of the above.

Wasco systems, which include everything but the stovepipe, sell for the following prices: One-car system, \$65; two-car, \$84; three-car, \$105; four-car, \$126; five-car, \$140.—W. A. Schleit Mfg. Co., Inc., Syracuse, N. Y.

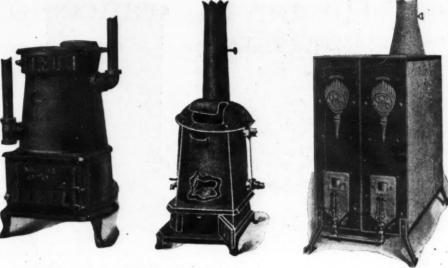
#### Four Stewart Types

Stewart—Four types of Stewart heaters are made. They are of the hot-water type and the different sizes are made to accommodate garages from 18 to 22 ft. up to 34 by 40 ft. Type A is made entirely of cast iron, with the exception of the body which is sheet iron. This outfit includes water heater and boiler and comes in three sizes, ranging in price from \$32.50 to \$40.50 for the heater alone. Where coal is used for fuel a self-feeding magazine is used, which will keep a steady fire from 24 to 48 hr. without attention. The price of the magazine is \$2 or \$2.50 depending on the size of the heater.

Style B heater is similar to A, except the water heater in the fire pot is omitted. However, the body of the heater is drilled for the water heater so it can be installed later, if desired. Style B, including the tank, comes in three sizes and prices vary from \$35 to \$43. The magazine for feeding coal is the same as for style A.

Where it is desired to heat both the floor where the heater is located and rooms above, the style C heater is furnished. This type embodies both the heater and coils in one drum. It is made in three sizes, wherein the diameter of the fire pot ranges from 18 to 35 in. Prices vary from \$77 to \$307.50. Hot water for washing cars or other use is furnished by means of a coil in the fire pot connected to the boiler. This heater is made to burn either coal, gas or both.

Some states are very strict in regard to the heating of garages and require that a heater be separated from the garage proper by an 8-in. unpierced fire wall. This practically eliminates any method of heating excepting by steam or hot water. The style D Stewart heater complies with insurance regulations by reason of its construction. The water in it entirely surrounds the fire pot, thus obtaining direct action of the fire. The water section is cast in one piece and there is a brick lin-

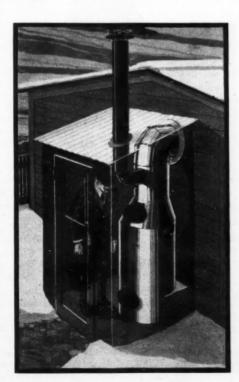


Stewart heater, left, Rippley for two-car garage, center, and Scientific

ing 4 in. high around the fire pot which prevents outside action on the fire resulting in poor combustion. Type D is made in three sizes at \$36, \$46 and \$62.

The discount on all of these heaters is about 25 per cent. Fuller & Warren Co., Troy, N. Y.

Seeger—The Seeger garage heater is a small hot-air furnace made in two styles, type C and L. The former is self-regulating and has a gravity feed magazine holding a scuttle of coal which is sufficient for 24 hr. It occupies less than 2 ft. in diameter floor space and stands 30 in. high. The main parts are of cast iron and the drum which surrounds the heater proper is sheet iron. All openings to the fire are guarded by fine mesh brass screen, eliminating the danger from fire. The type C is suitable for one- and two-car garages and sells for \$45.



Seeger hot-air garage heater

Type L was designed to accommodate the demand for a heater to be placed outside of the garage, thus saving space inside and complying with fire laws of certain sections. Type L heater can be housed in a small lean-to immediately adjoining the room to be heated. A round vent cut through the siding for hot-air duct and an oblong vent for cold-air duct are made in the building when installing the heater. The former opening conveys a strong current of heated air into the garage while the cold air is drawn out through the lower duct to the heater. Draft for the fire is taken from the outside and this feature makes the heater comply with insurance regulations. Type L heater sells for \$55. Seeger Mfg. Co., 1336 Monadnock Building, Chicago.

Rippley-This heater uses coal, wood or coke and is large enough to heat the average two-car garage. It is made of cast iron and heavy steel plate and the top is so designed that it will deflect heat, thus using all the energy from the fuel. There is an automatic regulator consisting of a float that rises and falls with the expansion and contraction of the water and in turn opens or closes the check draft in the pipe and fuel door. This action heats or cools the water in the pipes and regulates the temperature. Two pipe manifolds for connecting pipes and also one vent to permit free circulation of water is furnished with the heater. It occupies a floor space of 4 sq. ft. and the height to bottom outlet of pipe system is 16 in. Price, east of the Rocky mountains, is \$75, and west of the Rockies, \$85. Rippley Mfg. Co., Grafton,

#### Circulates Warm Water

Neverout—This device offers a means of circulating warm water in the water-circulating system of the engine and at the same time is said to furnish enough excess heat to warm the ordinary garage. It is practically a heater within a heater, the outer portions being screened the same as a miner's lamp. It burns kerosene and heat is brought to sufficient intensity by means of a special blue flame protected from the atmosphere by a safety screen.



Superior air-tight heater, left, and Lalco, which comes in two models

The heat passes to a coil where the water is heated and flows by natural circulation to the top of the radiator through a rubber hose. From the radiator drain cock another tube runs to the lower end of the copper heating coil. The method of operation is simple. Water is taken from the lower part of the radiator through the drain cock, passed through the heating chamber, whence it is returned through the filler tube of the radiator. The hot water reaches not only the upper part of the radiator immediately, but by conductivity flows through the water jackets, etc. When the car comes in at night it is only necessary to make the connections at the top and bottom of the radiator and set the heater going. It is made by the Rose Mfg. Co., Philadelphia, Pa.

#### Kerosene Used as Fuel

Wickless-The Safety Stove Co., Grand Rapids, Mich., makes a wickless garage heater using for fuel the lowest grade of kerosene. It consumes from 2 to 4 gai. in 24 hr., it is stated. The body is of iron and so made that an additional section can at any time be put on, or a special boiler section added when hot-water heating is desired. There are no springs, wicks or levers or any part that may need renewing. The burner is at the extreme bottom of the heater, easily lighted and regulated, maintaining any desired degree of heat and demanding no attention beyond filling the fuel tank and regulating the needle valve to meet any change in weather conditions. It has the indorsement of insurance companies.

When so ordered the Wickless heater can be fitted with a thermostat regulator which automatically controls the amount of fuel, thereby maintaining a constant temperature regardless of weather conditions.

It is made in three sizes. Number 3 size sells for \$27.50 and is suitable for a room 20 by 30 ft. It requires a floor space of 4 sq. ft. Number 4 costs \$30, requires the same floor space as the former, but will heat a garage 24 by 40 ft. The same outfit with a hot-water boiler sells for \$35. Number 5 is the smallest heater and sells for \$16. It requires 1 ft. of floor space and



Wasco self-regulating system

heats a room 12 by 16 ft. The thermostat regulator sells for \$5.

Superior—The Superior garage heater is an air-tight furnace consisting of a combustion chamber and tubular radiator secured inside a galvanized casing lined with asbestos. It burns natural or artificial gas and stands upon feet, but brackets can be used if desired. The combustion chamber contains a single piece cast iron drilled burner, a basket of patent English fuel and a pilot light. All the air consumed by the burner enters through the intake pipe from a safe place outside the building; no gases or fumes can enter from the inside.

The heater is provided with an automatic self-locking gas-proof door which need be opened but once during the cold weather to light the pilot light. No matches are needed after the first lighting, hence the danger attending their use is removed. A small circular window in the center of the door enables the owner to see

the condition of the fire on the inside. The window is made of mica, protected with safety gauze.

The Superior heater is made in two sizes, one 41 in. long, 13 in. wide and  $37\frac{1}{2}$  in. high. This is said to be large enough to heat a garage having from 5000 to 6000 cu. ft. Price, \$30. The other size is 27 in. long, 13 in. wide and  $36\frac{1}{2}$  in. high. It is called the Cosy heater and intended for garages from 2000 to 3000 cu. ft. It sells for \$24 and differs from the Superior in that it is fitted with a smaller burner, swinging door and a safety latch. These heaters are made by the Superior Mfg. Co., Pittsburgh, Pa.

Bower-Lang-This heater is arranged with a gas-tight wall or partition. It is so designed and installed that it stands in the room to be heated, thus heating the latter by direct radiation like a stove would, but with this difference. All outlets or openings through which gas might enter are located on the other side of the gas-tight partition. It operates just like a coal stove and the grate is made to burn pea coal, as well as larger sizes. The fire pot is lined with fire brick and lugs and plate are provided which makes it easy to build to any form of gas-tight partition, terra-cotta or plaster block, brick, metal, etc.

#### On Walls of Garage

One way to install the Bower-Lang heater is in the outside wall of a garage, without a feed room. The outside wall for about 3 ft. around the heater should be made of fireproof material. One or two iron- or tin-covered fireproof doors give access to the heater openings and protect the front from the weather.

The total height of the heater is 50 in. and the diameter of the fire pot 17 in. The diameter of the drum from which heat is radiated, is 28½ in. It is stated that this size heater will heat an unlined frame or sheet-metal garage of from 4000 to 6000 cu. ft. It can also be installed in batteries of two or more for large garages. Safety Heater Co., East Orange, N. J.

Lalco-This heater is made in two models, differing in size only. Type E, for natural or artificial gas and kerosene oil is equipped with a pilot light and automatic igniter, matches being unnecessary. It is japanned black, while the casing is of galvanized sheet iron. It is 35 in. high and 20 in. in diameter. The type E is also provided with a ventilator cap and 3-in. flue pipe connector for the products of the fire to pass through after they have been robbed of the heat by the radiator or drum, pierced with nine tubes which by vacuum draw the unheated air through from below. It is stated that the average annual cost for gas consumption on 30cent gas should not exceed for the entire winter months a total of \$10, for a private garage to be kept at a temperature of 45 deg. during zero weather. Type F is 41 in. high and 30 in. in diameter. It is intended for repair shops and public garages, when used in multiples. Lalco heaters are made to conform with the requirements of the National Board of Fire Underwriters. Loeffler-Maxwell Stove Co., Pittsburgh, Pa.

#### Ball and Roller Bearings

Comparison of Their Efficiency and Requirements Feature Indianapolis Meeting

Load-Carrying Ability and Lubricating Discussed

NDIANAPOLIS, Ind., Dec. 8-Ball bear-I ings are more satisfactory for average installations than roller bearings on account of their better efficiency, less possibility of trouble and their longer life, according to a ballbearing maker. The fundamental weakness of roller bearings are their inability to maintain alignment of the cylindrical roller and thus produce a tendency to bend the roller which destroys the line contact and the supporting oil film. The load-carrying ability of the ball bearing depends upon the contour of the race, the diameter of the ball, the area of contact, the material used in its construction and the accuracy of manufacture.

These were the chief features of a paper on "Some Fundamentals of Rolling Support" presented by S. W. Gurney, Gurney Ball Bearing Co., to the Indiana section of the Society of Automotive Engineers last

evening.

The chief pre-requisite of the ball bearing is that the point of rolling contact must be stationary. Slippage between the balls and race must be reduced to a minimum as it results in reduced efficiency. Of course in a commercial design, some slippage must be present due to the difference in the periphery of the bottom and side of the race as, in ordinary instance the arc of contact is about 15 to 20 deg.

#### Contour Varies

The contour of the ball race varies for large, medium and small ball bearings, the larger having a greater percentage of curvature than the smaller. The radius of the contour of the ball is ordinarily about 2 per cent greater than the radius of the ball, thus with a 2-in. diameter ball the contour radius would be 1.02 in. It was shown that a cylindrical roller slightly larger in diameter in the center than at either of its extreme ends to have the same percentage of radius for the shape of the race contour would have a radius fifty-one times greater than the ball of equivalent

The load-carrying ability of a ball varies usually as the square of the diameter of the ball, although there are some excep-

tions to this rule.

It was explained that the ball bearing, due to the contour of the race and the elasticity of the ball, had area of contact instead of the theoretical point contact, in this approximating closely the roller bearings area of contact. The load-carrying ability varies almost directly as the area of contact.

The balls for ball bearings are made from a special chrome steel, possessing rigidity and great compression strength. The ball must be able to withstand great shocks and still not assume a permanent set. These balls can be compressed several ten-thousandths of their diameter without causing a permanent set.

The process of ball manufacture has been improved to such an extent that it is now possible to make balls of an accuracy to a few hundred thousandths of an inch, thus these balls are as perfect spheres as is physically possible to make them. The assembly limits are about 0.0001 in.

The real weakness of the roller bearing is the cage for holding the rollers in alignment. This device is not satisfactory as it does not accomplish its purpose, and when out of alignment the rollers are subject to bending action. This fact is recognized by a well known maker of roller bearings, who constructs the rollers in a manner such that they will be flexible.

In the discussion it was brought out that in rear axle design it was sometimes necessary to use roller bearings in place of ball bearings on account of the large diameter of the latter which would be necessary to carry the load, influencing the weight of

this unsprung part.

In answer to a question as to whether the ball or roller bearing was most efficient for front wheels, S. W. Gurney replied that the ball bearing had proved most efficient by actual test. A case was cited where the chief engineer of a large company had conducted experiments by using rollers in one front wheel and balls in the other. After a most severe test it was determined that the average life of the ball bearing was 75 per cent greater.

With reference to lubricants for ball bearings, it was stated that the ideal ball bearing required no lubricant and that ball bearings usually run cooler dry than when lubricated. The lubricant serves only to prevent corrosion and support for the points where slipping contact prevails. Bearings must be kept clean as any small particles cause vibration, which result in minute chipping of the ball or race. These minute particles oxidize forming oxide of iron, which is an excellent abrasive and would rapidly destroy the bearing. Thus, it is imperative to use a neutral lubricant, that is, one free from acids.

Regarding the success of the ball bearing in railway service, it was stated that some years ago a steam train was operated with ball bearings, but due to improper installation and undersize bearings the installation was a failure. Profiting by this first experience and using larger bearing of the radial thrust type to take care of end thrust, which was partly responsible for the failure of the steam train installation, success has been achieved in electric

railway service.

#### PREMIER PROMOTES CRAWFORD

Indianapolis, Ind., Dec. 7-Charles S. Crawford, formerly associate chief engineer of the Premier Motor Car Co., has been promoted to the position of assistant general manager, in charge of production.

#### **FEW CHANGES IN GRANT**

Cleveland, Ohio, Dec. 8-No radical changes mark the Grant cars for 1918, most of those being in change of appearance. The wheelbase has been increased to 114 in. and the long low effect emphasized by a change in fender design. The cowl and hood lines likewise have been changed.

#### Tractor in Center Stage

Ignition and Electric Starting and Lighting with Their Pros and Cons

Spark Plug Standards Action Is Withdrawn

MINNEAPOLIS, Minn., Dec. 7—Two meetings devoted to the advancement of tractor engineering were held here Wednesday, a meeting of the tractor division of the Standards Committee of the S. A. E. during the day and one of the Minneapolis section of the S. A. E. after a dinner at 6:30 o'clock.

Final action was taken on only 'a few items. Reports from sub-committees were received and in most cases referred back to the committee with instructions for further investigation. A condensed specifica-tion blank finally was approved by the committee. This provides for all the chief specifications of the tractor and is intended for use in the trade catalog.

#### Two Papers Presented

In the evening two technical papers were presented, one by J. A. Williams of the K-W Ignition Co., on the subject of "Tractor Ignition," and the other by J. A. Gelzer of the Wagner Electric Co., on "Electric Starting, Lighting and Ignition for Tractors." The former mentions the advantages of plowing at night by electric light, the possibilities of boys and women operating a tractor with an electric starter, the possible saving in fuel due to shutting down of the engine whenever the tractor is stopped, the elimination of drudgery and the possible use of current for purposes such as vaporizing the kerosene. A low charging rate will suffice in a tractor and consequently the life of the battery and generator should be long. Tractor engineers fear that the farmer will be puzzled by the maze of wires, that the starter would fail in extremely cold weather, that the battery would quickly succumb to the violent vibration and that the service problem would offer difficulties as tractor service must be given in the field. C. S. Whitney of the Willard Storage Battery Co., when called upon to speak for the battery men, gave it as his strong conviction that all battery difficulties could be overcome, and described the exceedingly severe tests given by Government engineers to batteries for the Liberty trucks.

A report on drive-wheel punchings was accepted as a progress report. It recommends that wheel rims be cut in lengths of even numbers of feet, that spoke holes be punched 12 in. apart, that rim widths be in multiples of 4 in., that all rims be punched with 16-in. holes for lugs 2 in. in from both edges and with a third row of

lug holes between.

A report on space allowance for magnetos with impulse starters was adopted. It had been proposed to standardize connecting-rod head-bearing bushings, and a tentative table of sizes was presented by Joseph Van Blerck, but it was unanimously resolved not to carry out this plan.

Magneto mountings came in for consideration during the afternoon session, and it was resolved that in the event a castiron or other magnetic-supporting bracket is used a skin, at least ½-in. thick, of brass, aluminum or other non-magnetic material, to be furnished by the engine maker, shall be inserted between the bracket and magneto, and bronze bolts shall be used for fastening the latter in place. The distance from the top of the skin to the armature axis is to be 1.77 in., 45 min.

An elaborate table of belt sizes for different horsepowers to be transmitted as follows was submitted:

 Under 20 hp.
 6 ½

 20-30 hp. inclusive.
 7 ½

 Over 30 and up to 70 hp.
 9 ½

This was based on a belt speed of 2600 ft. a minute and gave different widths for four-, five- and six-ply belts respectively.

It was the consensus of the tractor engineers present that the ply could be regulated and that three widths of pulleys would meet all tractor requirements.

In the matter of spark plug standardization the division realized that it had proceeded rather too fast when it adopted the metric plug-18 mm. diameter, 11/2 mm. pitch-as a standard for tractor work, and the division resolved to rescind its action. The problem has to be investigated both with respect to heating and fouling. Metric plugs are to be used on Liberty aircraft engines, Liberty truck engines and on motorcycle engines, and the prospects are that eventually they will be adopted as standard for passenger car engines. The tractor engineers present at the meeting favored the plan of trailing motor car engineers in this matter.

sioned officers they will have charge of the enlisted men in the service stations that keep our aircraft tuned up to fighting trim. This short cut to officers' commissions, which in each instance will be at least a first lieutenancy, and in some cases a captaincy, is, of course, alluring. Applications should be made immediately in writing or by personal call to an air service recruiting station, one of which is located in each of the twenty largest cities. If no such recruiting station is near, the applicant should write to Major E. Z. Steever, Signal Corps, Aero Personnel Section, 119 D. street N. E., Washington, D. C.

#### Oxy-Acetylene Welders

THE office of the quartermaster general of the army is in urgent need of the services of oxy-acetylene welders and is looking particularly for men competent in general repair work, especially aluminum and motor car cylinders, who will enlist in the mechanical repair shops units, Quartermaster Corps. This is for immediate service in France. Men who enlist in these units and possess proper qualifications will be made non-commissioned officers later. Only men who have not been examined under the draft can be enlisted.

#### Signal and Ordnance

THE Signal Corps and Ordnance Department are still calling for men to fill the positions previously listed in Motor Age. From 60,000 to 100,000 are needed in the fifty different lines of work open in the Signal Corps, and the pay ranges from \$30 to \$62.50.

About 9000 men are wanted immediately by the Ordnance Department as skilled and unskilled soldier-workmen. Men of almost every vocation and trade are needed, in particular motor car repairmen and machinists. Wives and dependents are provided for. The wife receives half the husband's pay plus \$10 a month for one child plus \$5 a month for each additional child.

#### Training More Mechanics

THE first class was graduated last month from the motor car school established by the St. Louis Automobile Manufacturers' and Dealers' Association under the patronage of the Central Y. M. C. A. This class was chiefly mechanics employed in local shops who had taken the sixteenweeks' course at the night school. Ten weeks ago a day school was opened and it is enrolling pupils from Missouri, Illinois, Pennsylvania, Colorado, Georgia, Oklahoma, Arkansas and North and South Dakota. Eight weeks' work will be required of day classes. Five weeks ago several women enrolled to train for ambulance driving abroad. Their entrance was effected by a contract made by the St. Louis chapter of the Red Cross which will send no more women abroad as ambulance drivers until they have been drilled in scientific driving and emergency repairing. It is expected that this class will be large. Applicants for enlistment as drivers who believe themselves equipped for the work will be sent to the school for examination.

#### Motor Age's Recruiting Service

NCLE SAM wants at once top notch motor car repair and service station experts. The men lucky enough to be selected will be commissioned as first lieutenants and captains in the aviation section of the Signal Reserve Corps. The matter was put up to the members of the National Automobile Chamber of Commerce in Detroit by a representative of the War Department, and manufacturers were asked to assist the War Department by recommending their most capable service men for these posts.

The men who apply for these positions must know gasoline engines and have modern shop experience, as well as knowledge of tool equipment, materials, etc., and they must be men of "officer material," which means men of administrative and executive ability

Some of these men are to be stationed as commissioned officers at the flying schools in this country, and others will be transferred soon to France, where as commis-

#### AVIATION ENLISTMENT BLANK

Just fill in, cut off and mail this application

Volunteer Bureau, 119 D Street, N. E., Washington, D. C.

I desire to enlist, as a skilled workman, in the Aviation Section of the Signal Corps.

If you are not a skilled worker, go direct to any Army Recruiting Station and enlist anyhow as a private in the Aviation Section of the Signal Corps. Good men of any sort are needed, and good men soon find their proper level.—MOTOR AGE.

If you will be called by draft, when?....

APPLICATION		FOR	ENLISTM	IENT
Ordnance	Depart	ment,	National	Army

(Address)
Chief of Ordnance, U. S. Army, War Department, Washington, D. C.
Sir: I respectfully request permission to enlist in the Ordnance Department, National Army, and hereby certify that the following statements are correct and are in my own handwriting:
Birthplace and date of birth
Nativity and present residence of parents
Height Weight
Have you received a notice to appear for examination before a local draft board?
Are you married?
Have you attended college? If so, how long?
Are you a member of the National Guard of any State or Territory or in Government service
in a civil service capacity?
Have you ever served in the United States Army or in any foreign army? If so, state particulars
For what occupation in the Ordnance Department, National Army, do you desire to
enlist?
Experience: NOTICE—No action can be taken on your application if the statement below is not signed: I hereby certify that there is no one entirely dependent upon my labor for support, who, in my absence, will be left without reasonable support after duly taking into consideration soldier's wage and support available from relatives, or dependent to such an extent that cir- cumstances might arise which would result in my application for a discharge because of dependent relatives. (Published in Motor Age.)

(Signature of Applicant).....

The instruction is practical in both day and evening classes. The students are given practice in disassembling and assembling various makes of cars and also in making adjustments and repairs. Some repairing is done. Mechanical and electrical lectures are given in the laboratories of the school by experts in these lines. The student gets in the school shop the actual experience of putting into practice the theory taught in the class room. The theory is not credited in work, unless the practice follows and demonstrates the student's grasp.

#### **Five Distinct Courses**

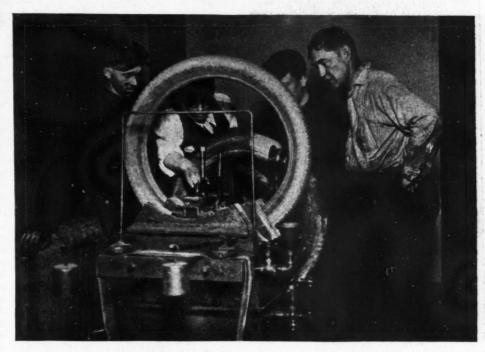
The school provides for five distinct courses which may be taken either in the day or evening: the complete course, preparing men to become repair men, chauffeurs, garage managers, salesmen, demonstrators, etc; the electrical course, for men who have a considerable knowledge of the car but have not mastered lighting, starting and ignition; owners' course; driving course, either individual or group instruction; and machine shop course. One of the strongest departments of the school is the tire repair and vulcanizing department.

The principal and mechanical lecturer is C. C. Winn from the University of Wisconsin, where he had charge of the motor car classes, in which the enrollment reached 1000 a year. Mr. Winn entered the industry as a designer and worked for the Studebaker, American, Briscoe, Marion and other factories. C. L. McCord is lecturer on electrical topics; Gus Bowman, instructor in vulcanizing; Arthur Sigelhorst and G. R. Peterson, instructors in mechan-

ics. All of these men made their living at the trades they now teach.

The sixty-five firms composing the Automobile Dealers' & Manufacturers' Association of St. Louis, who is backing the school, takes students at the end of the courses in their shops and under their foremen for a two or four-week period of actual shop work. The school equipment includes all important parts, models, engines, etc.

It varies through the various types of carbureters in modern and older models and different ignition systems, electrical starters, one-cylinder to eight-cylinder engines, various types of transmissions in use on standard and old model cars, differentials, rear axles, cooling systems, oiling systems, clutches, tires, rims, brakes, etc. The school uses modern cars for driving purposes. Instruction on tractors is given.



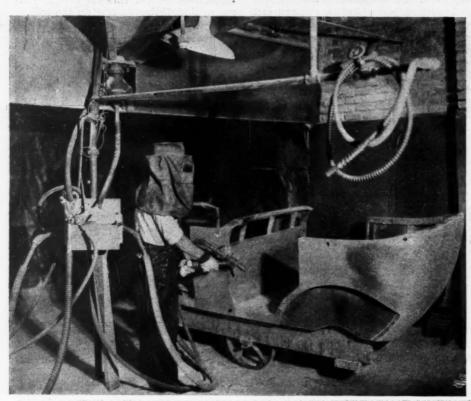
Teaching vulcanizing at the St. Louis dealers' school for mechanics



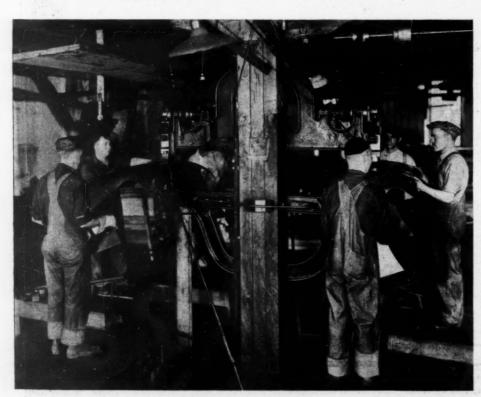
Stripped chassis are fundamental studies in the St. Louis school, and each student makes that a part of his course

#### Bodies Built in the Old Way

#### Modern and Veteran Methods Feature Stephens Construction



Not a man with a gas mask, but part of the sand-blasting process to prepare the body metal for the several coats of paint



Shaping body panels for the Stephens Salient Six and insuring uniformity by hammering according to definite patterns

THE bodies for the Stephens Salient Six and the Henney commercial bodies for Ford cars are built in what might be called the old-fashioned way, though the term does not mean modern methods are not used. At the Stephens Motor Branch of the Moline Plow Co., Freeport, Ill., 300,000 sq. ft. of floor space is devoted to their manufacture, the process of which contains a contrast worth studying in modern, laborsaving methods and veteran ways of building bodies.

Every piece of lumber used in the construction of a body first receives drying treatment in the kiln. There are ten of these kilns, which are in reality huge rooms in which 150,000 ft. of lumber can be treated at one time. The drying is done by steam pipes, laid in the floor of each kiln to maintain the necessary heat.

The thoroughness of construction found at this body-building plant is demonstrated in the dressing and painting of the steel bodies. First the sand blast is used. This leaves the surface to be painted with minute roughness. The sand blast gives the steel a grain into which the paint fastens itself, making the peeled paint bugbear an unknown quantity. After the sand blast comes the lead priming coat; then another sand blast and another coat of lead. A preparation coat then seals the roughness, making a smooth surface for the next coats. Three coats of rough are air dried. Then a last coat of rough is rubbed and the first coat of color applied. Two coats of color varnish are applied, rubbed, and covered with the finish coat and striping. Compared to the enamel process this method is old-fashioned, but the company uses it because it considers this the only method to make the paint permanent.

#### Sandblast Room

The sandblast room and its equipment is a novel feature of the Stephens' factory. The operators work under a large hood with a grated floor and a back of sheet steel which slopes upward to a vent leading to a suction fan. The sand which is powdered with the blast, and for that reason is useless, is drawn out by the fan and the heavier sand, which can be used again, drops through the grating into containers below. If the light sand, or dust, were driven in its dry state into the open air, it would find its way throughout the factory and would be especially troublesome in the paint shops. To eliminate this the jet of air and sand sucked from the blast room is drawn through fine streams of water. The air thus is washed free of sand and emerges clean into the open. The sand gathered by the water deposits itself into vats, from which it is carried away, wet and quite harmless.

The idea of permanence is carried out also in the sealing of the panel seams. Spot welding is used whenever possible. Then the open portion of the seam is sealed by acetyline welding, making the entire





One of the two batteries of kilns used for drying the lumber which goes into Stephens bodies, left, and curled hair for the seat backs, which comes in strips mounted on cloth

body virtually one piece. Solder is used only as a smoothing agent. Absolute uniformity in body paneling and doors is insured by hammering the shapes according to definite pattern. Each door is fitted to its own body as tops are fitted. Hence, a definite pattern is used.

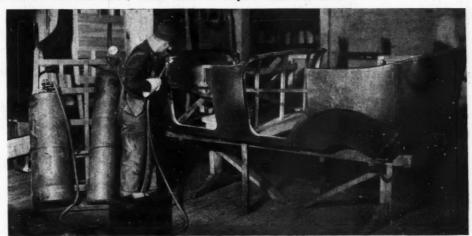
All strains imposed on the body are relieved at the frame of the car. Bridging and bracing are such that the frame receives the strain, eliminating springing and twisting of the body. Top irons are made integral with a forked forging which passes down the inside of the body and bolts to the woodwork, which in turn is bolted to the frame.

#### Real Curled Hair

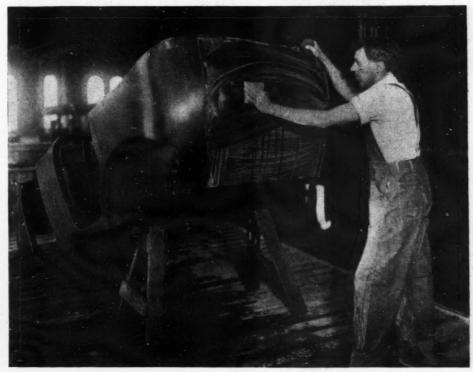
Real curled hair is used in the upholstery. This is bought in pads of the correct shape, so that instead of having to stuff loose hair until a smooth finish is assured, the upholsterers sew the pleats in the leather and slip strips of hair mounted on cloth between the pleats. A pair of tongues compress the hair to enable the upholsterer to shove it between the pleats. For the backs, pads of hair mounted on cloth of the correct size are laid in place and the upholstery built over them. Such labor-saving methods as these, with others, are credited by Stephens for its ability to furnish D'Arcy upholstery springs, real curled hair, genuine leather upholstery, hand painting and a permanently substantial body in a medium-priced car.

#### **GUEST CANNOT GET DAMAGES**

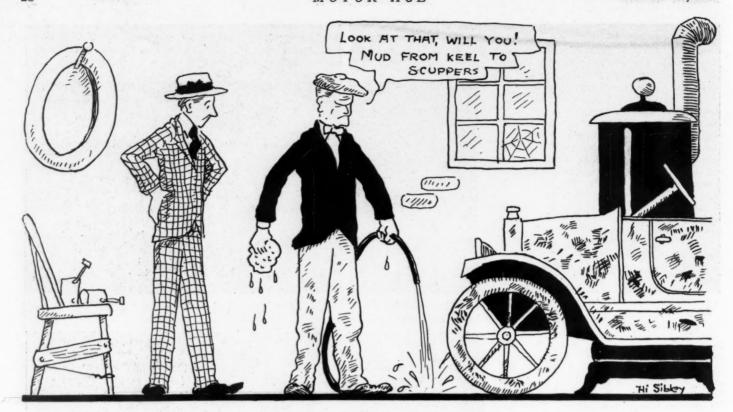
Boston, Mass., Dec. 7—The Massachusetts Supreme Court has decided that an invited guest cannot recover damages if injured through the fault of the chauffeur, unless gross negligence is proved. It does not define gross negligence. The plaintiff was thrown out of a car when it was overturned in Newton. A jury awarded damages on the grounds that the driver was negligent, but the Supreme Court reversed this decision. It states, however, that a person paying a fare may recover for slight negligence but a guest riding for nothing is not in the same class as one paying a fare.



Every seam in a Stephens body is sealed by acetylene welding, making the entire body virtually one piece



Hand rubbing follows one of the priming coats, part of the old-fashioned process to insure permanency



#### Tales of the Alley Rats-No. 3

THIS is the third of a series of articles based on the stories told by Captain Manlove A. Shuey, or Cap, as he is more often known, a pioneer dealer whose tales are of the early days when a dealer's life was very extraordinary indeed. The last of the series was "The Mad Mobile," and the next, to be published in an early issue, will be called "The Convivial Mobile."

AP SHUEY, proprietor of that snug little alley garage known to a select coterie of his friends as the Rat's Nest, was busily engaged in washing a much bespattered T-A-D. Evidently he was in a bad humor over something, for he jabbed viciously at the mud-caked wheels with a dripping sponge and now and then let loose an indignant snort. Presently, straightening up and addressing the half dozen Alley Rats assembled there he growled:

"Look at that, will you? A brand new buggy all mud from keel to scuppers! And just to please a mummified old tightwad who's been wheedlin' me along for six years now, throwin' out hints about how nice it would be to own a car. You boys know him—Uncle Eph Walker; got enough money to buy up the British navy, and since he first poked his nose into this place I've took him just 804 rides, no more and no less. But I'm done with him now, ab-so-lute-lee!

"Yesterday morning he shuffled in here for his annual spring visit, making some cracks about looking at a new car, but what he really come for was to git warm, prob'ly, so's he could save coal at home. Well, anyway, I ain't no more'n human, so I fell for his talk and invited him out

#### The Perennial Prospect

By Hi Sibley

to ride in this new wagon, just off the cars. I seen in the paper a couple of days ago where Uncle Eph had turned over one of his little slices of property for fifty thousand or so, and it struck me the time was about ripe to land the old buzzard.

"So we started out and tried every sort of road in the county. I showed him all the fine points and that little T-A-D certainly did put herself out to please me and boost the game. Why she breezed along so smooth and run so easy that she'd almost coast uphill. As a finishin' touch I come back by the way of Sumption Prairie, where they are fixin' the roads and we was in slush up to the hubs, but that wagon plowed through without a whimper.

Thinks I, it's about time we come to a showdown, Mister Walker, so I said: 'Lookee here, Uncle Eph, when we git back to the gerridge if you'll just decorate an order with your captivatin' signature I'll turn this car over to you right now.'

"Right away he begun to squirm around in his seat like it hurt him to think of so much money, even, and whined, "——I—why, Cap, I can't hardly afford to tie the money up in a car now and besides, automobiles ain't perfect yet. They'll git 'em perfect and they'll sell a lot cheaper so's a poor man can have one, just like bicycles was. No, I ain't quite ready to buy yet. You come around next fall and mebbe we can talk business.'

"Well, I was so dad-burned mad I couldn't talk, but I opened up that T-A-D and come to town so fast Uncle Eph's eyes stuck out like a couple of chiny doorknobs.

And I dumped him at the end of the first streetcar line.

"Automobiles ain't perfect yet! O shucks, that's the same old wheeze they used to pull way back when I was selling Mobile steamers. Of course they ain't perfect. They ain't anything perfect. They've been building engines on the Grand Trunk ninety-six years and they ain't perfect by a darn sight. I know, because I been up to Dee-troit a thousand times and they ain't once that the engineer didn't have to stop to pin a smokestack back on again or straighten up a bent spoke.

"Boy," Cap continued, warming up to his subject and taking a generous chew of Fast Mail, "I ain't got any money myself, but I'm enjoyin' life as I go along. Them rich fellers that never rode in an automobile because they wanted to wait until they was perfect—some of them fellers are out in Riverview cemetery now, occupying just 6 ft. of ground, not an inch more'n me and you'll have. But they left their money behind so's their lawyers could eat pie and frog legs.

"Every man that's got the price ought to git a car, because they ain't no tellin' where he'll be to-morrow. We only live once, boys, and then we're an awful long time dead. There's old Sam Biddle; what did he do? Why Sam slaved all his life—I can remember when he didn't have no more clothes than a pair of overalls—Sam pinched and scrimped and always looked hungry until he had piled up half a million dollars. Then, having finished that little

chore he lay down and died. Did he ever git anything out of life? No! But his heirs have wore out three cars apiece since he was laid away and are so busy lookin' up new models they ain't had time to cut

the grass on old Sam's grave.

"No matter how rich a man is he can't be no more'n just so happy. Take John D. Rockefeller, fer instance. Every Saturday night he has to back a couple of trucks up to his office to cart his pay envelope home. He goes in to supper and takes a couple of pills and a raw egg and then four powders and a glass of milk, and then he has to lay quiet a couple of hours to digest it. I may be a poor man, but, by hookey, nobody's going to git more satisfaction out of life than me. I git an automobile ride whenever I feel like it, and when I set down to a meal I eat everything in sight, and don't fuss none. I don't envy no man."

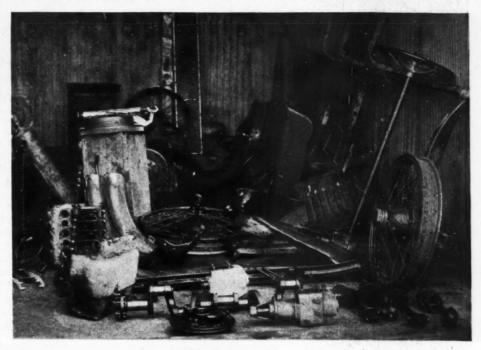
#### Motor "Spurlos Versenkt"

SPURLOS versenkt—to sink without a trace—is a very real term with motor car thieves in New York, according to the experience of Charles A. Hopfensack, sales manager of the Brady-Murray Motors Corp., whose car was "picked up."

Nothing was discovered for some time, and Hopfensack had about made up his mind that the car had gone to the port of missing cars from which there would be no returning. Then a cluster of barns on the Harlem river attracted the owner's attention. A man had rented one "for a friend who wanted to run a repair shop." Almost immediately the "repairmen" began to bring cars of various makes to the place, and the owner, though not an expert, began to notice the repairs never were completed—the car that went into the barn never seemed to come out again.

Then one day "the repairmen" rented a horse and truck and spent 24 hr. transferring "machinery and parts to their other shop." Before long the barn owner decided the men were doing too much hauling and too much night work and notified a friend who was a detective. The men were arrested as they drove up with another stolen car. When the barn was

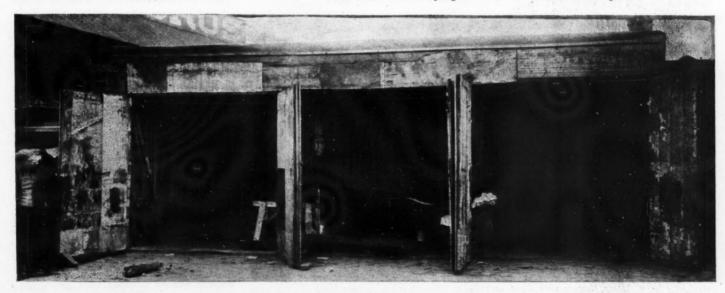
opened a veritable car boneyard was disclosed. The place was filled with the parts of dismantled cars. Pistons, frame, engines, wheels, springs and steering columns were in orderly groups. There was one body—a four-passenger—and while in one of the side pockets the detective found a road map case with Hopfensack's name.



What the car looked like when the thieves got through with it



The car's owner trying to locate his vehicle in the parts



This is the barn that harbored the thieves that made "spurlos versenkt" part of motor car raminology



## Electrical Equipment Sche Motor Car +



By David Penn Moreton & Darwin & Hatch.

Editor's Note—Herewith is presented the seventy-third installment of a weekly series of articles begun in Motor Age issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered. Ignition was taken up next.

#### Part LXXIII—Electrical Accessories

THE trouble lamp usually consists of a small reflector on the end of a convenient handle and provided with an incandescent lamp of proper voltage. A flexible extension cord is provided for connecting the lamp to one of the lamp sockets on the car or one specially provided for the trouble lamp. One form of trouble lamp is shown in Fig. 407. In some forms a reel is provided upon which the extension cord may be wound. The reel usually is operated by a coiled spring which is under tension when the extension cord is pulled out.

#### Electric Heaters

The electric heater is a device in which electrical energy is converted into heat energy. A device of this kind frequently is used in keeping the engine warm and preventing the radiator from freezing in a cold garage. Two electric heaters for this

purpose are shown in Fig. 408. The electric heater is sometimes installed in the intake manifold to get better carburetion and thus facilitate starting. A device of this kind is shown in Fig. 409.

#### Signals and Direction Indicators

Several different kinds of electric signals and direction indicators have been devised and perfected so that the driver of a car may give notice to those immediately behind of his intention to stop or turn to the right or left with a view to eliminating the danger of collision. Devices of this kind are shown in Fig. 410. The Warner device shown at A in the figure consists of a brass outer housing with a rectangular opening cut out in the back side of it. Inside this brass shell there is a glass tube directed into four sections. On one of these sections there appears in large letters the word STOP. Another section is colored plain red and the other two are labeled TURN with arrows pointing to the right and left respectively. Three electromagnets are mounted inside the brass shell at one end, and these magnets may be made to act



Fig. 407—One form of trouble lamp, lower, with light installations

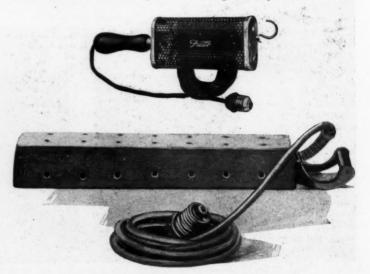


Fig. 408-Two kinds of electric heating devices

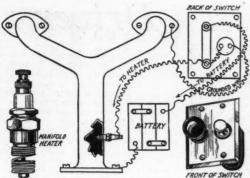


Fig. 409-Manifold heating device, left, showing installation

upon an armature attached to the shaft upon which the glass tube is mounted. The position of the glass tube, of course, will depend upon which of the magnets is acting upon the armature, which in turn will depend upon which button or circuit is closed. In the cross-section shown, the armature is at the bottom where it tends to stay normally under the action of gravity, the magnets being de-energized.

The Safety-Lite signal which is shown at B in Fig. 410, indicates the direction in which a car is going to turn by means of arrows. The device consists of a metal containing case containing electric bulbs which may be controlled from the dash or steering wheel. The light from the electric bulbs, depending upon which one is lighted, brightens either the right or left arrow so as to render it clearly visible to a driver in the war.

A third form of signal, called the Pomeroy, is shown at C in Fig. 410. This signal is provided with three solenoids. Two

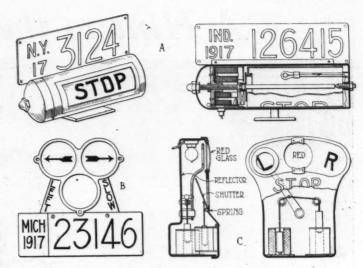


Fig. 410-Several different types of signals

operate the swinging indicator lever so as to show L or R, and the third controls a shutter which normally hides the word stop from view.

There are many other forms of signals and direction indicators, but they all have a common purpose, and their operation should be made as near automatic as possible. For this reason in a great many cases, the electrical circuits controlling their operation are opened and closed by the driver in operating some part of the car, such as pressing the brake pedal, which will cause the word "stop" to appear on the signal board.

#### TOO MANY WAR TAGS

Louisville, Ky., Dec. 8—More than 100 owners are evading the law requiring state license tags by using a sign with some form of army designation, it has been disclosed by investigations conducted by Col. C. F. Crain, provost marshal at Camp Zachary Taylor, assisted by the civil authorities of Jefferson County.

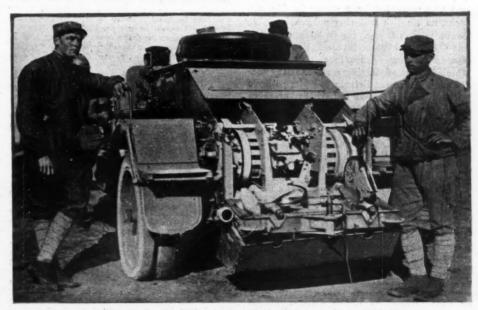
Since the opening of the camp hundreds of new machines have been bought both by officers and civilians engaged on business in the reservation. A common practice seems to have developed in the use of tags purporting the owner to have some connection with the camp and the machine being used on Government business. Scores of officers who purchased machines merely used a tag showing the numeral designation of their organization such as "4th Bat.," "334th Inf.," "Q. M. C.," etc.

To the police the sudden introduction of hundreds of variously inscribed tags on machines presented a puzzling situation. Under the impression that anything bearing a Government designation was not to be stopped there has been practically no effort made to have machine owners questioned concerning their tags. Quick to notice the lack of uniformity in Government tags, many unscrupulous civilians leaped at the opportunity to save a few dollars by using a tag which caused police officers to believe that they were Government machines. Several machines owned by civilians in private business are known to have used tags with nothing on but the words "Camp Taylor." Others used the abbreviation "Co.," followed by a numeral which was usually accepted as a company designation.

Believing that some of these offenders are ignorant of the fact that they are evading the law and realizing that it would be a hard matter to prove a case against them in court while so many different tags are being used, the authorities have decided to make no arrests until Dec. 15. A warning has been issued by the Commanding General at the camp directing that no motorcycle or car be used on the reservation unless they bear the license tags of a state or one issued by the provost marshal. On and after Dec. 15, however, the military police at the camp have instructions to arrest all persons driving cars and motorcycles within the limits of the reservation who have not either state license tag or a tag issued by the provost marshal. The same step will be taken by the city and county.

#### SHOW AIDS TO FARMERS

Cleveland, Dec. 8-The fourth annual farmers' exposition opened here yesterday with 200 exhibits of farm machinery alone. Every form of mechanical device for speeding up farm production and permitting a reduction in man power-two points essential to winning the war-are on exhibition. Among them are farm tractors, trucks, farm lighting systems, truck and tractor adapters and gasoline engines. That passenger cars are essential to the farmer is indicated by the fact that nearly every Cleveland dealer likewise is staging exhibits at the show, together with accessory exhibits by the accessory dealers. The exposition will continue until Dec. 15.



Truck with observation captive dirigible "somewhere on the western front"

#### A Hint to the Wise—Driver



Miss Natalie Camp of New York, now driving an ambulance in Russia, according to reports. Before leaving for Russia Miss Camp collected funds for the Russian Red Cross at the wheel of a Russian ambulance in New York

N interesting result of the war is noted A in a collection of so-called useful hints and tips presented by a writer in The Autocar, an English motoring publication. No doubt most of you, the women at least, have followed with interest the English woman in new occupations, chief among which is that of driving and repairing motor cars. In Great Britain the women have without doubt made an indelible impression in the field of motoring. The hints and suggestions are such as would be given to the occasional driver rather than to one who has become expert, though there is much of wisdom in them even for the most expert. Here they are in brief:

Don't loll. It is very distressing to see even

Don't loll. It is very distressing to see even a mere man sprawling languidly behind a steering wheel, but it is far worse in the case of a woman. The woman who holds herself well has a way of making a good impression wherever she may be, and this applies equally whether she be sitting at a dinner table or behind the steering wheel of a car or walking in the street. Don't presume on the fact that you are a lady, because, though most men drivers will make way for you even when you are in the wrong, they will think the less of you while they do so, and there are some who will insist on their "rights" as vehicle drivers. Should you encounter the last-named there is likely to be a smash.

Don't think about the possible impression you may be making on other road users. The best impression is made by the lady driver who is impression is made by the lady driver who is unself-conscious and who attends strictly to the business in hand. There is still in the minds of a good many people an idea that it is not safe for women to drive cars. Do your best to destroy this quite erroneous impression by han-dling your vehicle with caution and with consideration for others.

Don't imagine that other drivers will necessarily stare at you. If they do it will almost certainly be not because they are admiring you, but for the reason that you have done something which has made them doubtful as to whether you know how to drive. Show them that you do.

Don't take unnecessary risks. We are all taking risks every minute of every day, but only the unwise take those they can properly avoid. Sooner or later the motor car driver who rashly challenges providence will find that providence accepts the challenge and providence almost invertibility wins the day. Also rememalmost invariably wins the day. Also remember that the really sound, as distinct from the flashy, driver always gives himself or herself the greatest possible margin of safety.

Don't "shave" things. The best drivers give pedestrians, animals and other vehicles as much clearance as possible—not as little. Most old hands can, if they care to do so, miss the obstruction by an inch or so only, but few of them think it good form to show off in this way. They have a habit of mentally cataloging a driver who leaves inches between himself or herself and disaster when he or she could leave feet.

Don't forget that the car has four wheels, or it may shed one—to your discomfiture. This hint is of special importance when driving around a curve. Bear in mind that when you are turning a corner to the left your near side rear wheel will be closer than the rear side front wheel to the curb or other obstruction on your left; therefore, give ample clearance for the front wheel. The same principle applies when a corner to the right has to be negotiated.

Don't try to watch both front mudguards. If you are not sure that your car can be driven through a narrow passage, slow down almost to a standstill, and then cautiously go forward, concentrating practically the whole of your atconcentrating practically the whole of your attention on the outside edge of your right front mudguard. Steer that as close as you can to the obstruction on your right, making allowance for the hub cap of the off front wheel possibly projecting beyond the edge of the front mudguard. With the knowledge that you have mudguard. With the knowledge that you have not any space to waste on your off side, you can tell at once, as you get to the narrowest part of the passage, whether or not your near side mud-guard and hub cap will clear the obstruction on

Don't cut corners. Drivers who steer on the wrong side of the road around a right-hand corner merely because by keeping on the inside of the curve they have the camber in their favor, and can so maintain a higher rate of speed without danger of skidding, should be removed to criminal lunatic asylums.

Don't take left-hand blind corners at high speed. Although if you hug the near side of the road you will be on your proper side, you must recollect that you may meet one of the criminal lunatics aforementioned, who, on his wrong side, is taking the same corner on the road on the inside of the curve around blind

Don't drive fast over wet roads in populous districts. A pothole full of water may not be much to you, but to the pedestrian who receives in his face the water ejected from the pothole by your tire it is a matter of moment. Remember the last time a dray splattered you with city mud.

#### Four Ways to Save Sugar

Put one lump or one spoonful in your

Do without on your cereal and fresh fruit.

Do not make frosted cake.

Use molasses in cake.

Economy means wise expenditure of time, money or energy. Waste is failure to use food materials to the best advantage, says the Food Administration of Chicago.

Several hundred outdoor signs bearing the message "Food will win the war, don't waste it'' have been erected over the country, and more are being planned and constructed. The locations are of the best, on public grounds and buildings and factory and business premises—city halls, post offices, parks, public libraries, banks, railroad stations, lodge buildings, public squares, courthouses, county and Federal buildings, police stations, fire houses, markets, power houses, bridges, theaters, customhouses and prominent skyline locations. Advertisers with prominent illuminated signs have donated space. Chicago has an electric sign with a moving message, donated for food-saving publicity, and New York has one. Though the campaign is just starting, it already represents in money a publicity value of more than \$500,-000 a year.

Are you observing these food-saving signs in your home and at the restaurants?

### The Motor (ar Repair Shop

#### Connecting Rod Alignment Jig

A SUBSTANTIAL connecting rod alignment jig which, if accurately made, will prove a very satisfactory one is shown in the illustration. It is preferable to have the frame a casting made from gray iron and properly seasoned. The frame of the jig must be designed so that the distance C will be the same as the distance from the center of the wrist pin to the center of the crankpin bearings. When the frame is ready for machining extreme care must be used, as the accuracy of the jig depends upon the exactness of the machine work.

The shaft G must be perpendicular to the face plate D, and the two holes M and N must be parallel to each other. The face plate D and the test bar E should be made from one piece of stock with their shafts and test faces at right angles, or 90 deg., to each other. The shaft of the test bar E should be the same-diameter as the wrist pin.

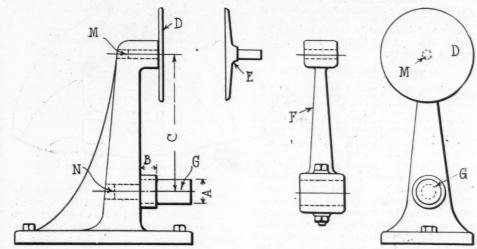
The collar B should be of such length that with the test bar E it will be possible to align the connecting rod on its vertical center line as well as to test the rod for the wrist pin and connecting rod bearings' parallelism. By this method it is possible to insure the piston's running true in the cylinder and also to have the upper end of the connecting rod centered on the wrist pin when these parts are assembled in engine.

To test a connecting rod for alignment, first mount the rod on the shaft G with the test bar E inserted in its upper end. The test bar E is first placed in a vertical position and tested for alignment with the face plate D. This will prove whether the rod is true to its vertical center line. Next swing the test bar E to a horizontal position and test for alignment with the face plate D. This will prove whether the wrist pin and the connecting rod bearings are parallel to each other.

The shaft G can be made in various diameters to permit the jig to be used for more than one type of connecting rod, as a slight variation in the center to center distance of the rod will not affect the usefulness of the jig.

#### Usual Engine Knocks

Knocking in an engine is one of the hardest things for even an expert to locate on account of the many internal noises which are all more or less alike in sound, making it very difficult to distinguish which is the cause of the trouble. Location of trouble is made easier where one is familiar with the engine and thus has his past experiences to guide him in isolating the defective part. The character of some knocks make them rather easy to distinguish, as the noise made by a loose piston is usually easy to tell from other noises. This knock, caused by a loose piston, is called a piston slap. It is rather difficult



Jig for testing connecting rod alignment, for more than one type

sometimes to determine whether a knock which sounds like a loose connecting rod bearing is due to the bearing or to excessive spark advance.

There are about five general causes of knocks in engines. These are: Spark too far advanced, excessive carbon deposits on pistons and cylinder walls, loose connecting rod bearing, piston too loose, broken piston ring and loose main bearing.

Spark knock is the one with which the average driver is most familiar, and it is a dull metallic sound without the noise caused by metal striking metal. The best way to become familiar with the spark knock is to make the engine pull under heavy load with fully advanced spark and thus observe the resulting noise. This same noise also can be heard when accelerating rapidly from a standstill to the average driving speed.

Knocking due to carbon deposits produces a hollow, pounding due to the carbon's becoming incandescent and causing ignition of the charge of gas before it is ignited by the spark and before the piston completes its upward stroke. This knock is called pre-ignition knock.

A connecting rod knock is due to the bearings having too much play and is noticeable each power stroke by a clear metallic ring. This noise can be located by shorting the spark plugs in the various cylinders by the metal end of a hammer or other tool which is insulated. Thus the cylinder in which the noise is located can be found by stopping it from firing. Of course, the only remedy for a worn bearing is to have it adjusted, for if the engine is permitted to run with a loose bearing it will soon be the cause of considerable trouble. Complete failure of a bearing under these circumstances is liable to wreck the entire engine.

Piston slap can be heard under heavy load or when the throttle is thrown open

suddenly. The sound resembles a dull thud and if the cylinder walls happen to be lacking oil it will be more metallic in sound. This noise is either due to wear from long use or to improper fitting when assembling. It can be overcome only by fitting a piston of proper clearance to prevent the slap between the piston and the cylinder walls.

Broken or loose piston rings produce a sharp metallic sound and can be heard when the engine is accelerated rapidly to a high speed under no load.

A loose crankshaft main bearing produces a muffled heavy sound which increases in intensity as the load on the engine increases. This noise can be heard at low speed when the engine is under load but is not so prominent as it will be at higher speeds. The only remedy is to have the bearing adjusted, that is remove an equal number of shims on each side of the bearing until you get the proper clearance.

#### Points to Watch

Asbestos packing is used on the flanged joints of the exhaust pipe. These gaskets can be had in various sizes to fit standard manifold connections. If they are not available asbestos board will answer the same purpose. It should be soaked in water and rubbed with graphite before it is put in place. Inlet manifold joints can be made tight with shellac.

The joints in the cooling system, such as unions, flange elbows, etc., may be smeared with red lead and oil. At this season of the year, the owner should go carefully over the water connections to make sure they are tight, as otherwise much of whatever form of anti-freeze solution he uses, will be lost. It is a good plan to get under the car occasionally and inspect the radiator for small leaks. There is but one real remedy for such leaks, solder.

#### eadevs' learing

#### The Electric System

Wiring of 1913 Humobile

Q.—Show wiring diagram of Hupmobile 1913. —W. Thornton Mays, Marshall, Tex.

This model did not have an electric starting system and the ignition is by a hightension magneto.

#### Ignition Timing Early

Q.—What causes engine to knock, an even knock on all explosions, when throttle is opened and when car is going up a grade with spark retarded? I cleaned out the carbon and ground the valves, but the engine still knocks, but not as much as before. There is no knock when the car is running along on level. The compression is fair, get about 19 miles per gallon.—Theodore Mueller, St. Louis, Mo.

1-The knock is probably due to the ignition being too early in the retarded position of the spark advance lever. It would be best to determine first if the spark advance linkage has not become disconnected at some point and allowing the engine to run on fully or partially advanced spark at all times, or else there is so much lost motion in the linkage that it is impossible to retard the magneto to its fully retarded position and thereby cause the engine to develop a spark knock under heavy load. The condition of the linkage can be checked by moving the spark advance lever from full retard to full advance and back again and observing if the magneto timing lever body at the magneto is moved through its full range of advance. Providing that the trouble does not prove to be either of the above then it will be necessary to retard the timing of the magneto. It is possible to change this 1-4 revolution at the coupling between the magneto and water pump. By changing the ignition timing 1-4 revolution it will probably make the timing too late and cause the engine to overheat; nevertheless it will do no harm to try this position. Remove the four bolts at the magneto coupling and turn the magneto through 1-4 revolution in the direction of rotation. If by trial the timing proves to be too late then it will be necessary to change the position of the magneto back to its original setting. The timing will now have to be changed by setting the gear in the timing gear case driving the water pump and magneto back about one or two teeth in its direction of rotation. The magneto should be set so that the breaker points will just begin to open in fully retarded position when the piston has traveled 1/8 in. downward past its upper dead center on the firing stroke.

#### Valve Timing

Timing 1913 Hupmobile

Q.—How are the ignition and valves of a 1913 Hupmobile timed?—W. Thornton Mays, Mar-shall, Tex.

The flywheel on this model is marked to aid in timing the engine and these marks can be seen by removing the gearset housing cover.

By referring to Fig. 1 the line A indicates the dead center position for the engine crankshaft. The camshaft should be set first and to do this remove the

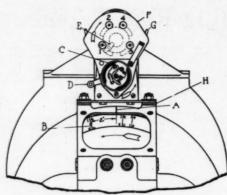


Fig. 1-Timing 1913 Hupmobile engine

valve cover plate so that the tappets are exposed to view. Then turn the flywheel until the marks 1 and 4 I. O. coincide with the line A on the gearset housing. This mark indicates that the inlet valve is just beginning to open on No. 1 cylinder. Now turn the camshaft by means of the fan pulley until the inlet tappet for No. 1 cylinder just begins to rise. The camshaft and crankshaft are now in correct relation to each other and the timing gear drive chain can now be attached. The chain, of course, is to be attached without changing the position of either the camshaft or the crankshaft.

To set the ignition timing first remove the breaker box cover of the magneto and move the lever D to full retard position. Now move the flywheel until the mark 1

### Experience Meeting

#### What Was Your Experience with Double Treading?

IRES constitute the chief item of your I runing costs. Motorists are striving to get all the mileage they can out of their tires and many of them have treads put on worn tires to get additional use out of them, the same as a person has new soles put on his shoes.

Many of you have tried double treading and can give information to others who may be undecided as to the relative merits of it. In writing, tell how long you had driven the particular tire before it was repaired, the condition it seemed to be in, were you satisfied with the job when it was complete and did the cost sem to warrant the repair. Also, when is it not advisable to double-tread a casing? Are you thinking of having any more tires fixed up by this method? If not, why not? How much additional mileage did you get out of a casing so repaired?

This will be used with your signature or not as you prefer, but in every case the letter must carry full name and address.

and 4 CL at B is 2 in. past the center line A on the gearset case. At this point the interrupter should just begin to break at full retard, as shown in the position C. If the interrupter is not in this position, loosen the nut on the shaft holding the magneto sprocket and turn the shaft around until this position is obtained. Also be positive that the distributor brush E makes contact with No. 1, taking care that neither crankshaft nor camshaft revolve while setting the magneto. This brush is easily accessible upon removing the distributor cover F.

The tappet clearance should be the thickness of a thin card.

E. M. F. Valve Timing

Q.—Show diagram for valve setting of 1912 E. M. F. I have just installed new gear on camshaft and am not able to climb hills. The crankshaft has thirty teeth, sixty on cam, thirty on magneto. Rear housing is bearing on rear axle. How can I take out the shaft of the wheels and install new bearings?

2—Is No. 1 cylinder No. 1 from radiator or from clutch?—E. A. Stiles, Aurora, Ill.

1-The valve timing is illustrated in Fig. 3. The inlet valve opens when the piston is 16 in. from upper dead center, and closes when the piston is  $\frac{7}{32}$  in. from lower dead center. The exhaust valve opens when the piston is 16 in. from lower dead center and closes when the piston is 1 in.

from upper dead center.

It is possible to replace the live shaft outer bearing by removing the rear wheel which is held on by a nut and key on a tapered shaft. After the wheel has been removed the bearing can be pulled out of the end of the rear axle housing. If it is necessary to replace the shaft itself then the entire rear system will have to be removed as the live shafts are held inside of the differential carrier assembly by nuts. After removing the rear axle from under the car dissemble it by taking off the housings and then take the differential carrier assembly apart. The differential compensating gear on the opposite end of the live shaft can now be removed and a new shaft installed.

2-Cylinder No. 1 is always considered as the one nearest the radiator.

#### Miscellaneous

Is This Fastest Ford?

Editor Motor Age-The Ford car shown in the accompanying photograph was built in 1914. It has a 94-in. wheelbase, the engine being set back 9 in., making the car balance well. The Ford radius rod is not used, new ones being installed on each side, with ball joint at rear end. It has a fast camshaft, large tungsten valves, portsbored, larger manifolds, 11/2-in. Schebler carbureter, Bosch magneto and Houk wheels.

It made a mile on dirt track at Indianapolis in 50 sec., 25 miles in 22 min., using 3 to 1 gears and 31 by 4 tires, and on 1/2mile track with 3 7-11 gears, it made it in

I believe it will do better than 90 m.p.h. on a speedway under favorable conditions. Recently on a 1000-mile trip, I averaged 27 miles to gallon of gasoline.

The car has cost quite a bit of money, as I have done lots of experimenting, but have won it back racing. I believe this is the fastest Ford car in the world, bar none.— Allan D. Sebold, Louisville, Ky.

#### Hudson Racing Ratio

Q.—What was the rear axle gear ratio for the Hudson racing car?—F. M. Allen, Tulsa, Okla. The gear ratio used was 2.76 to 1. Wheel size, 33 by 5 rear, 32 by 41/2 front.

#### May Be Dry Gearset

Q.—How can I locate grating noise as if gears were rubbing against something? The noise is only when the car is running about 12 to 15 m.p.h. above and below that speed and when clutch is disengaged the noise ceases. The car is a 1915 Dodge Brothers.—Theodore Mueller, St. Louis, Mo.

A gearset will make this noise when it lacks sufficient lubricant and it would be well to examine this first. A chipped gear or a broken bearing are also possibilities but not probable in this case. This may also be due to the starter gear becoming loose on the front end of the crankshaft. This condition is caused by frequent starting with the spark fully advanced and the reaction of the engine with advanced spark tends to loosen the gear on the crankshaft. Then this noise due to the chain drive will only be noticeable between certain speeds and probably disappears when the clutch is disengaged on account of the change in engine speed.

#### Tells Why Ford Plugs Foul

Savanna, Tenn.-Editor Motor Age-In the Nov. 15 issue of Motor Age I have read with interest the communication from Clayton Smith regarding spark plug trouble in front cylinder on Ford car. From my own observations I am compelled to disagree entirely with his explanation of this trouble for reasons which I give below.

In his second paragraph he says: "Due to actions of centrifugal force and gravitation the heavy grades of gas and some gasoline travel up the goose-neck on the side farthest away from the carbureter, straight up in upright pipe, and is pulled forward into No. 1 cylinder causing an over-rich mixture which fouls the plug."

In defence of the design of the Ford intake manifold would like to say it is designed to feed gas properly balanced to both the front and rear cylinders. The vertical section of this manifold has a general direction more toward the rear intake port than the front, but because of the Slike path of the gas through this manifold, the gas feeds alike both the front and rear intake ports. Of course centrifugal and gravitational forces affect this gas, but not in a way to feed one quality of gas to the front port and another quality to the rear port.

The spark plug trouble in the front cylinder is caused by an excess amount of cylinder oil working up past the piston into the upper part of the cylinder. This oil does not burn and pass out, but remains to deposit on the plug and forms a short circuit. The second cylinder is also troubled with this and so are the third and fourth cylinders found this way at times. The first cylinder is troubled more than any of the others, the second next, the third next, and fourth next.

It will pay to examine the condition of

To assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has inaugurated the segregation of inquiries into classes of allied nature. Questions pertaining to cooling will be answered under that head and so on.

THE ELECTRIC SYSTEM
W. Thornton Mays.....Marshall, Tex.
Theodore Mueller......St. Louis, Mo. VALVE TIMING

W. Thornton Mays.....Marshall, Tex. E. A. Stiles.....Aurora, Ill.

ENGINES

carbon deposits in the cylinder head and on tops of all pistons. A comparison of the carbon deposits of each cylinder should be made. I find we have several kinds of carbon deposits. One is a hard crystal carbon caused by the incomplete combustion of gas. Another is caused by the burning of cylinder oil in the combustion chamber and is softer, gummy and usually greasy. When this deposit takes place to a marked degree, the exhaust gas will be colored blue, showing that cylinder oil is burning with the gas. And then a greasy exhaust outlet from the muffler is also found, provided this pumping of oil has continued long enough.

It might be well to consider the cause of this undue amount of oil in the two front cylinders. For all regular purposes the oil is fed to the cam gearcase by means of an oil feed pipe which gathers oil in the transmission and feeds by gravity to the front of the engine. This oil flows out of the cam gearcase, first into splash pan

for No. 1 cylinder, then No. 2, then No. 3, and back into transmission case. The fourth connecting rod bearing gets its lubrication from splashes of the flywheel. It is an evident fact that to get a flow of oil from the first splash pan to the second and from there to the third and at the same time against the splashing made by the flywheel, a head of oil must be maintained in the front of the crankcase. This head of oil combined with the location of the breather pipe is just exactly what causes the trouble. Imagine an oil level for the first cylinder about twice that of the third with a draft of air passing all the time to and from the breather pipe through all this oil. I believe that the location of the breather pipe is equally responsible with the head of oil for this extra lubrication given this front cylinder. Oil should be fed the bearings from parallel connections and not in series as in the present method. However, this trouble is very easily and inexpensively overcome by a simple ring sent out by the Ford factory. This ring is called the tapered ring and if placed on the two front pistons will cause a pumping action of the oil in a downward direction. After the installation of these rings the cylinders will remain dry and free from cylinder oil. I have never found a case yet which could not be cured easily by installing these rings .- J. B. Walker, Savanna, Tenn.

#### Acid Treatment of Radiators

Q.—Give formula for cleaning the scale and sediment from motor car radiators which will not injure the metal.—A. C. Fitzsimmons, Independence, Kan.

As a means of removing the rust and scale which will accumulate in old radiators a treatment of hot dilute, sulphuric acid, or the same as is used for storage batteries, in most cases is very effective. About 1% gal. or 30 lb. of 66 deg. Beaume acid slowly poured into 4 gal. of water will so heat the water that it is ready for use. This should be mixed in a lead lined tank. It is imperative that the acid be poured into the water and not the water poured into the acid, as the combination of the two produces extreme heat and there is danger of it being splashed on the hands or the clothes of the operator.

To cleanse the radiator stop up the upper inlet and entirely fill the radiator with

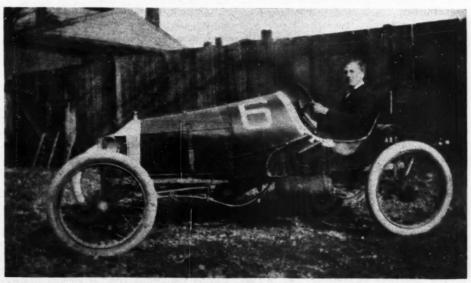


Fig. 2-Reader's rebuilt Ford car which he believes is fastest in world

the acid. This should be allowed to stand for about 10 min. It can then be drawn off and the radiator thoroughly washed with clean water. In most cases one treatment will be sufficient. The reason for filling at the outlet is that the largest part of the dirt is in the top part of the radiator and by handling it as above, it prevents trying to carry this dirt all the way through the radiator core.

In washing the radiator, the upper inlet should be plugged and the radiator entirely filled with water before being drawn off, for if the water is simply allowed to pass through, the air will not be forced out from all parts of the radiator and consequently these parts will not be washed. This operation should be performed at least three times.

It is not necessary to use a fresh solution for each treatment. The acid may be kept in a lead lined tank and before being used warmed by means of a steam coil on the inside of the tank. In this way one solution will do for five or six treatments.

#### Weight of 1913 Hupmobile

Q.—What is the wel"ht of a 1913 Hupmobile? W. Thornton Mays, Marshall, Tex. The chassis weight is 1800 lb.

#### Gearsets Compared

Q.—Why is the sliding gear transmission used almost universally in building motor cars? Will a planetary transmission, such as used on the Ford, deliver more power to the propeller shaft than a sliding gear type, same size engine of same type being used in each case?—H. Y. McAlpine, Chatham, Ont.

The advantages of the sliding gearset over the planetary are lighter weight for the same number of speeds, less complication, less noise in the speeds, more compact for the same power transmission ability, and greater efficiency of power transmission. In the speeds the sliding gearset will transmit power with greater efficiency than the planetary transmission.

#### Anti-Freeze Solutions

Q.—Since manufacturers of anti-freeze solutions do not publish their formulas, is it not better to make one's own after the formula at the top of page 68, Nov. 1 issue of Motor Age? 2—Does glycerine injure rubber?

1-Standard anti-freeze solutions made by reputable manufacturers can be purchased on the open market at less expense than one can make solutions for in small quantities. These solutions are of proven value and past the experimental stage.

2-The hose connections in a cooling system will usually last through a season before they are in need of replacement when glycerine is used in the anti-freeze solu-

#### Columns in Garage

Q.—Publish plan for basement of garage 38 by 140, using some columns. Basement is 9 ft. high in clear. How can I construct a concrete floor as in sketch, and what kind of iron will it take to support this floor? How about crushed slag instead of stone?—A Reader, Chesterton, Ind.

The plan of the garages is shown in Fig. 5. The garage can be built with what is known as the long-span concrete floor without any columns. We would suggest girders of reinforced concrete about 10 ft. on centers across the 38-ft. span, then a plain monolithic slab, or the combination system tile and concrete, using the girders for bearing. The design of the floor will depend entirely on the live load to be used in the construction, which should be figured by your architect or engineer. As to the use of iron, would suggest making it en-

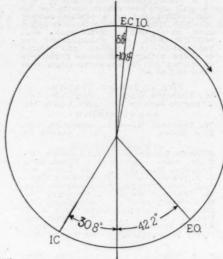


Fig. 3-Timing valves of 1912 E. M. F.



Fig. 4-Adjusting nut on steering column

tirely of reinforced concrete, using bars rolled from new billet steel. Crushed slag instead of stone would be perfectly satisaftory, provided the slag is clean. This can be used with sand or screenings from crushed lime stone. All concrete should be mixed ration of 1-2-4.

The plan is shown with and without columns in the basement, with a notation as to the need of heavier girders with no col-

#### Gears Shift Hard

Q.—I have trouble in shifting the gears of my 1916 Oakland six from first to second. It is very hard to slide out from first to second, and by the time it is thrown out the speed of the car has been reduced to such an extent that the gears will not mesh, with a resultant clashing of gears. It must, therefore, be caused by some binding of the low speed gears. From second to high the gears work easily and properly. The transmission case has plenty of oil and grease. What is the cause of this trouble?—Harry W. Oestrlich, Two Rivers, Wis.

It would seem from your explanation that this trouble is not due to the gearset itself but to the clutch brake. If the elutch brake is too tight and stops the clutch from spinning almost instantly when released it will be difficult to disengage the gears on account of the high pressure between the gear teeth due to the action of the clutch brake and the energy of the moving car. This can be proved by re-leasing the clutch just far enough to prevent the brake from acting and then observing if the gears do not release in an easy manner.

A sprung shifting fork in the gearset also would cause the gears to bind in shifting and a gear on which the teeth had been damaged due to frequent clashing would also act in the same manner.

#### Rattle in Steering Post

Q.—How can a rattle in steering post on 1917 6-37 Auburn car be overcome? The steering wheel is manufactured by the Jackson-Church Co. The rattle appears to be directly in the steering post beneath the wheel. The steering knuckles have been adjusted and all play has been taken up, with no effect. Will it be necessary to take entire apparatus apart?—Allan P. Houston, Jr., Chicago.

The rattle is probably due to end play in the steering column. This can be eliminated by tightening the adjusting nut at the top of the steering gear case. Providing this does not stop the rattle it may be due to the spark and throttle controls being loose in bushing in the steering column underneath the steering wheel. In order to install a new bushing disconnect the spark and throttle control gears underneath the steering gear case and then pull out the spark and throttle control rods. The bushing can now be removed and a new one installed in its place. An illustration of this type of steering gear is shown in Fig. 4.

#### Engines

#### Hudson Racing Engine Data

Q.—What is the size of valves, valve light and camshaft lift on the Hudson Super-Six racing engine? What was the weight of the piston and the connecting rods, also the flywheel?

2—If the flywheel were turned down to a smaller diameter, would the engine have more

speed?

3—What is the weight of the Hudson racing car? Should the water pump paddles be cut off to keep from throwing too much water?—
F. M. Allen, Tulsa, Okla.

1-The valves of the Hudson Super-Six racing engine were 1/8 in. larger than standard, with an increase of 16 in. lift. The pistons weighed approximately 11/4 lb., and the connecting rods, 2% lb., flywheel, 53 lb.

2-No extra power is gained by the use of a lighter flywheel.

3-The cars weighed 2500 lb. It is not necessary to cut off the water pump pad-

#### Operation of Gnome Engine

Q.—Explain how carburetion, ignition and valve action is effected on a Gnome rotary en-

gine.

2—Is this a two- or four-cycle engine?

3—How many revolutions per minute is a large model Gnome capable of making?—Esca Forgy, Shamrock, Tex.

The exhaust valve is mounted in the cylinder head, its seating being screwed in by means of a special box spanner. On the fourteen-cylinder model the valve is operated directly by an overhead rocker arm with a gunmetal rocker at its extremity coming in contact with the extremity of the valve stem. As in standard motor car practice, the valve is opened under the lift of the vertical push rod, actuated by the cam. The distinctive feature is the use of a four-blade leaf spring with a forked end encircling the valve stems and pressing against a collar on its extremity. On the seven-cylinder model the movement is reversed, the valve being opened on the downward pull of the push rod, this lifting the outer extremity of the main rocker arm, which tips a secondary and smaller rocker in direct contact with the extremity of the valve stem. The springs are the same in each case.

The engine is of the four-cycle type with automatic intake valves mounted in the head of the piston. The valve seating is in halves, the lower portion being made to receive the wrist pin and connecting rod, and the upper portion, carrying the valve, being screwed into it. The spring is composed of four flat blades, with the hollowed stem of the automatic valve passing through their center and their two extremities attached to small levers calculated to give balance against centrifugal force. The springs are naturally within the piston, and are lubricated by splash from the crank chamber. They are a deli-cate construction, for it is necessary that they shall be accurately balanced so as to have no tendency to fly open under the action of centrifugal force. The intake valve is withdrawn by the use of special tools through the cylinder head, the exhaust valve being first dismounted.

#### Exhaust Valves

Coming to the manner in which the exhaust valves are operated, this at first sight appears to be one of the most complicated parts of the engine, probably because it is one in which standard practice is most widely departed from. Within the cylindrical casing bolted to the rear face of the crankcase are seven thin flat-faced steel rings forming female cams. Across a diameter of each ring is a pair of pro-jecting rods fitting in brass guides and having their extremities terminating in a knuckle eye receiving the adjustable push rods operating the overhead rocker arms of the exhaust valve. The guides are not all in the same plane, the difference being equal to the thickness of the steel rings, the total thickness being practically 2 in. Within the female cam is a group of seven male cams of the same total thickness as the former and rotating within them. As the boss of the male cam comes in contact with the flattened portion of the ring forming the female cam, the arm is pushed outward and the exhaust valve opened through the medium of the push rod and overhead rocker.

The number of cams is the same for the fourteen as for the seven-cylinder engine; on the latter, however, there is but one flattened portion in the female cam ring and only one of the projecting arms terminates in a knuckle to receive the adjustable push rod, the opposite arm being merely a guide. The flattened portion is at the guide side; thus, when the male cam comes in contact with it the arm is caused to descend in its guide and a pull exerted on what has come to be known as the push rod. For the fourteen-cylinder engine the action is direct, for there are two flattened portions on the female cam ring, one at the base of each projecting arm, and they are lifted in exactly the same manner as the tappets of a standard type of engine. The group of male cams is driven primarily by a pinion on the crankshaft in mesh with two intermediate pinions, transferring their motion to the male cam pinion gear turning free on the extremity of the crankshaft.

The crankshaft of the Gnome is fixed and hollow. Advantage is taken of this

to supply fuel and lubricant to the engine.

The lubricant, consisting of pure castor oil, is fed to the two pumps by gravity and delivered from them through the sight feeds carried in any suitable position to tubes mounted within the hollow shaft. The oil is thus taken direct to the main bearings, to the crankpins and to the connecting rod ends. The oil driven through the bearings into the crank chamber suffices for lubricating the cylinder walls, but a large amount is taken into the combustion chambers with the mixture and driven out with the exhaust. It is this feature which makes the Gnome a considerable consumer of lubricant, and makers' estimate being 7 pints an hour for the 100-hp. motor; but in practice this is largely exceeded. The gasoline consumption is given as 300 to 350 grammes per horsepower.

There is no carbureter in the usual acceptation of that term, the substitute consisting of a brass elbow mounted on the hollow end of the fixed crankshaft. Within the elbow is an ordinary type of butterflythrottle, and around its vertical portion an ordinary air sleeve, generally employed only for starting. Gasoline is brought to this carbureter-which is really not designed to carburete-by means of a copper tube with a slightly restricted outlet. There is neither float chamber nor jet. In many of the tests made at the factory the fourteen-cylinder engine was operated with the extremity of the gasoline pipe pushed into the hollow crankshaft, speed being regulated entirely by increasing or decreasing the flow through the tap in the base of the tank.

Even under these conditions the engine has been throttled down so as to run at 350 r.p.m. without misfiring. Its normal speed is 1000 to 1200 r.p.m. From the crankchamber the mixture passes into the cylinders and then through the automatic intake valve which is mounted in the head of each piston.

#### Engine Backfires

Q.—What causes a Bosch magneto on a Velie car to kick? If I start by cranking on dry cells it backfires so badly I can't crank the car.—G. E. Stinke, Williamsburg, Iowa.

This may be due to a number of causes any one of which will be responsible for the back firing of the engine. To locate this trouble proceed as follows:

1-Lost motion in the spark advance linkage will prevent the magneto from being fully retarded, hence causing it to backfire. This can be checked by fully advancing the spark and then retarding it and observing if the breaker box housing on the magneto is moved through its full range of advance.

2-Breaker points should be set 0.010 in. when wide open.

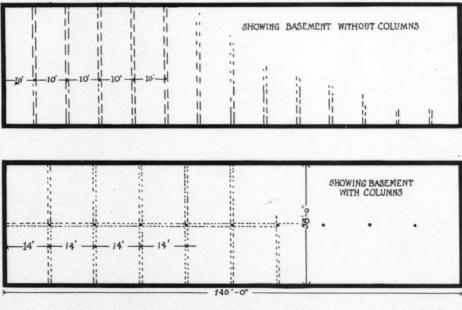
3-A dirty or cracked distributor board causing a short circuit between segments will cause back firing. It is sometimes impossible to perceive a crack in a distributor board and in order to prove that the original board is all right mount another board on the magneto for test purposes.

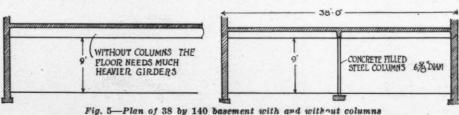
4-The breaker points should just open when a piston is on or slightly past upper center position. If the breaker points open before upper dead center is reached then the engine will backfire on account of too early ignition and it will be necessary to retime the magneto with reference to the position of the piston on the firing stroke.

#### Wants Knight Engine Data

Q.—What are the advantages and disadvantages of the Knight type engine as compared with the conventional poppet valve?

2—Are there any six-cylinder Knight-engined cars in Europe? If there are, why are there none on the market in this country?





3—Is it necessary to use a higher grade of oil in the Knight than in the ordinary engine?—C. H. Johnston, Friars Point, Miss.

1-The Knight engine is a proven type and has been successful, yet there is wide variation of opinion among engineers regarding the relative merits of the two types of engines. Silence of operation is one of the advantages claimed for the Knight type on account of the sleeve valve construction, yet this does not seem to be such an important factor at the present time when the designers of poppet valve types are silencing the valve gear by inclosing all of the working parts. Carbon is claimed to be a benefit to the Knight while it is injurious to the poppet valve type. The carbon is claimed to wear the sleeves to a smooth finish and to act as a seal between the piston, the sleeves and the cylinder walls, thus preventing the loss of compression. In comparing engines of the same piston displacement, the Knight is generally heavier than the poppet valve type. The mechanically operated Knight sleeve gear is positive in its action at all speeds, whereas the poppet valve gear is less positive at high speeds on account of the spring controlled valves. It is claimed that the Knight has a better shaped combustion chamber and there are other points but this will give an idea of the two types comparatively.

2-The Daimier, Panhard and Deasy are some of the foreign cars using six-cylinder Knight engines. The high cost of import and the keen competition are probably responsible for the scarcity of these cars on the American market.

3-The Knight engines use a good grade of medium oil that would be adaptable to any motor car engine.

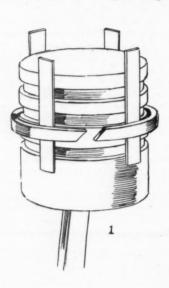
#### Engine Starts Hard

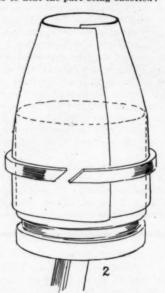
Q.—I can't start my Ford engine on the magneto after it has been standing over night. After I have started it on batteries, it will run on the magneto. Is that due to weak magnetos? Would recharging remedy it?

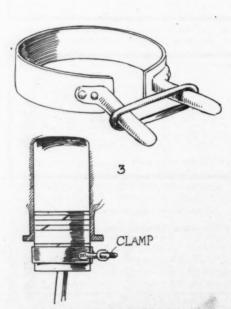
2—What is the proper clearence for Ford valves? Is it the same on all engines?

3—Can any part of the electric equipment, coils, etc., be injured by the use of test points of the 110-volt lighting current?

4—In babbiting a Ford bearing is it advisable to heat the part being babbited?







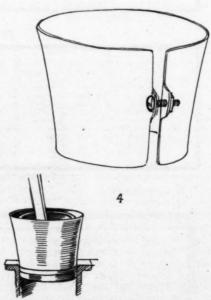


Fig. 6-Methods and devices for mounting rings on pistons and installing

5—How is the end-play taken out of the crankshaft on a Ford engine?—Oliver Sveir, Minneapolis, Minn.

It seems very likely that your difficulty in starting is due to weak magnets, or insufficient current generated by the magneto due to end play in the crankshaft. The latter would have a tendency to keep the magnets too far from the coils on the stationary part of the magneto and this would cut down the current materially. If your lights are not very bright you may be sure that the magnets are weak or too far from the coils, provided the lamps and connection are in good order. Recharging the magnets would help in the former case and this can be done by connecting six storage batteries in series to the magneto terminal on the transmission cover and grounding the other wire from the batteries to the frame of the car. Touch the wire to the frame about twenty-five or thirty times, holding it there but a few seconds at a time. This is claimed to be better than making one long contact.

Before re-charging the magnets you must have the magneto in the right position. Take a small pocket compass and place it about 1 in. to the left of the magneto terminal and a trifle back of it. Have someone turn the engine slowly until the needle of the compass points in a line with the engine. The magnets will then be in position for charging.

2-The clearance should never be more than 1/32 in., or less than 1/4 in. Naturally the best point lies just midway between these. The adjustment must be made when the tappet rests on the heel of the cam and with a warm engine.

The clearance is not the same on all engines. The clearance on one would not give good results on another. But as a general rule the owner will not go far wrong if he adjusts his tappets so that there is a space about the thickness of a visiting card between the valve stem and tappet.

3-Yes.

4-Yes.

5-No provision is made for taking out the end play of a Ford engine, but generally when this occurs the main and connecting rod bearings will be worn to such an extent that new ones are advisable. In this case the new bearings will take care of the crankshaft. Often the babbit can be worked with a chisel and brought against the fillets of the main bearing parts of the crankshaft. Ofter the babbit can be worked sufficiently with a chisel to build it up around the crankshaft fillets to overcome end play.

#### Fitting New Piston Rings

Q.—What is the proper method of procedure in installing new piston rings in engine of Hudson car, Model 6-40?—H. J. Peterson, Sturgis, S. D.

The first thing in fitting rings is to get the guides or grooves of the piston thoroughly clean, assuming that you have the pistons out of the cylinders. The pistons should be immersed in kerosene and sprayed to remove every trace of dirt. Much time and labor can be saved by seeing which ring most nearly fits a given groove.

The ring should next be inserted into the cylinder to determine whether the ends are the proper distance apart. If they touch they should be filed slightly. The

ring should be placed in a vise with one end protruding about an inch. A little is left sticking out so that it will not sway when filing is done. A fine file is then placed between the ends and with the left hand the long end of the ring is pressed lightly against the file. The operation should continue for a short time only. Usually about a dozen strokes of the file are sufficient. Put the ring back in the cylinder and measure the distance between the ends with a thickness gage, or as it is sometimes called, a feeler. Fifteen thousandths is a good distance to allow if the factory measurement cannot be obtained.

The next step is to make the ring fit the groove and this is done by lapping. A level steel surface is used for this, and upon it is sprinkled enough very fine emery powder to cover it. Enough water is then added to make the mass of a pasty consistency. The ring is then placed on the steel plate and a block of wood about 6 by 6 in. put on top of the ring. The ring is then carried back and forth by the block exerting a light pressure. If the ring will not stay in place under the block cut a little notch in the latter for it. Turn the ring over occasionally; lapping should be done on both sides of the ring. It should take about 1 min. to lap a ring. After lapping clean the ring and fit it to the groove it nearly fitted before. If every part of the circumference of the ring fits every part of the groove then lapping is complete and the ring may be tagged to designate its location. The same operation is carried out with each ring. When all have been fitted, the next step is to fit them into the grooves in the position they are to occupy when in use.

#### Mounting Rings on Pistons

Q.—Illustrate and describe methods of placing piston rings on pistons and for installing pistons in the cylinders of an engine?—G. F. McKim, Clinton; lowa.

Motor car manufacturers use no special machinery for placing piston rings on the piston, though the Ford Motor Co. does use a special device for placing the ring and pistons in the finished cylinder. This latter, however, is too complicated for use in the repair shop and the simpler devices hereafter described are better.

Two methods, however, are in use for placing the rings on the pistons. The first of these is at 1 in Fig. 6. Four strips of spring steel are slipped over the piston and held in place by the hand after which the ring is slid in place, guided past the open grooves and into the desired groove. The consecutive rings are slipped on in a similar manner simply by sliding the steel spring guides up to the next ring groove.

Another method used is at 2 in Fig. 6. A sheet steel cone exactly fitting over the piston to be used is made up from sheet metal and the rings slid over it into place very readily.

Two devices commonly are used for placing the pistons and rings in the cylinder. One of these is at 3 in Fg. 6. It comprises a spring steel clamp that may be locked in place, compressing the rings and permitting the piston to be slipped into the cylinder. The second is a tubular clamp of sheet metal at 4 in Fig. 6. This is bell-mouthed at the upper end so that the rings are compressed as the piston is passed through it, the lower end set up against the bevel edge of the cylinder so that the piston can be slipped readily into

Originally Ford had about fifty patents covering the construction of his car. The company is now fourteen years old and long since has stopped taking out patents. It is Henry Ford's personal opinion that patents are of no use and he places the value of his design upon quantity and production alone, as it is in this that he excels. As an example of this, no patents at all were taken out on the new Ford truck recently announced.

#### Carbon in Knight Engine

Q.—I have a Willys-Knight car, four-cylinder, driven about 400 miles. When the engine pulls heavy, it knocks some, though when I retard the spark it seems to do better. What is the cause of the knock?

2—It is claimed that carbon is a benefit to these engines and that cleaning out is not necessary. Is this true?

3—In cleaning out the crankcase with kerosene would you advise running the engine a second or so? Is it injurious to the sleeves if kerosene gets up in them?—A. W. Bardul, New Athens, Ill.

1-When pulling under heavy load the spark should always be retarded as the engine speed invariably decreases and with advanced spark the ignition of gas takes place before the piston reaches upper dead center causing what is known as spark knock. This condition is probably what causes the knock in your engine.

2-Carbon in a Knight engine tends to wear the sleeves smooth and also acts as a seal between the piston, sleeves, and the cylinder walls tending to thus prevent loss of compression. In case an excessive amount of carbon should become deposited on the piston head and the walls of the combustion chamber it would have to be removed in order to prevent preignition.

3-When changing oil in the crankcase it is advisable to flush the crankcase with kerosene and to run the engine for half a minute when the kerosene is in the case. There is small chance of a sufficient amount of kerosene getting between the sleeves in this space of time to destroy the oil film between them.

#### Knock in Engine

Rnock in Engine

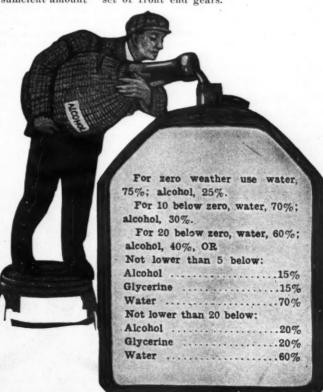
Q.—My hodel 6-30 Chalmers develops a knock which is suspiciously like a loose connecting rod. Examination and careful adjustment of all crankshaft and connecting rod bearings lead me to believe that the knock is developed in the generator. Tightening of nut on armature of generator does not remove the knock, which is noticeable at 23 miles speed or above only. Where can I locate knock, and how should I go about it? Is it possibly due to a worn bushing in generator shaft? There is no loss of compression, but the car cannot be run without a rolling knock above 20 m.p.h. As soon as speedometer shows 23 there is a pound that sounds as if one of the connecting rods were loose. Have not examined generator shaft, as that would interfere with the whole timing system of the car. Can you give a remedy for this knock?—Sidney Boardman, Lukachukai, Ariz.

The trouble you are experiencing with your Chalmers Six-30 engine is due to one of the two following conditions:

1-A loose center main bearing. As you probably know, a loose center main bearing in a high speed engine will make it possible for the crankshaft to develop a whip which creates a knock at speeds above 20 m.p.h. Our suggestion, therefore, would be for you to check up center main bearing condition and if found to be loose remove the necessary shim from each side of the bearing cam for proper adjustment.

2-Front end timing gears. We have also found in some of these engines a knock will develop at a speed of 20 miles or above which is very hard to trace. In some of these jobs it takes considerable experimenting before the trouble is isolated. In these cases we have found that at this speed or above, a seeming back lash or rattle develops in the cam gear. Therefore, it is advisable that you check the front end of this engine also, and if the cam gear has an indication of being loose install a new cam gear snugly fitted. If you are unable to obtain results by installation of the new cam gear, install a new set of front end gears.

Or Use One of the Proprietary Solutions Which Motor Age Has Described





Ease and comfort of operation mark the Trundaar. Note suspended seat and convenient control levers

### Trundaar Named by Tread

#### Tractor of Endless Belt Type for All Farm Work

THE Trundaar, a four-plow machine capable of 20 hp. at the drawbar and 35 hp. at the belt, is a creeper tractor for all forms of farm work from plowing to threshing. It is the result of twenty-three years' experiments and is the product of the Buckeye Mfg. Co., Anderson, Ind. The tractor is 6 ft. 2 in. long over all and 4 ft. 10 in. high and sells at \$2,950.

This tractor is named from its patented tread, of the endless belt type, built on the log-chain principle and differing from most treads of the type in that it requires no lubrication. Every link of the chains and every grouser plate is quickly detachable to facilitate replacements. A few spare parts thus provide ample insurance against delay in working the tractor.

The Buckeye company has acquired exclusive rights in the tractor field of the Deppe integrator, which has been familiar to automotive engineers for several years as the Deppe vaporizer and as the Superheater generator. This system is designed to make low-gear fuel operate like high-grade gasoline. A four-cylinder 4% by 6%-in. Buckeye-Waukesha special tractor engine is used.

#### Vital Parts in Oil

All vital parts of the Trundaar Tractor run in oil and are protected from dust. An efficient air cleaner is fitted to the intake of the Buckeye-Deppe integrator. The powerplant and tractor proper are protected from shocks and strains on the treads by a double three-point suspension. Power is applied to the treads and released by individual multiple-disk clutches, a new principle in tractor engineering. Two speeds forward and reverse are provided by the large spur gear transmission, which requires no differential. Two other features which mark an advance in tractor practice are the quickly adjustable power pulley and the spring-suspended driver's seat.

The patented Trundaar tread consists of a series of grouser plates carried on two parallel chains. A master link of each chain is bolted to each grouser plate, the connecting links between adjacent grouser plates providing the necessary flexibility. These connecting links are made short to minimize movement and consequent wear

as the chains travel around the tread wheels. Steel blocks carried on the grouser plate bolts strengthen the master links and hold the short links in place. A master lug bolted to the center of each grouser plate takes the drive from hardened steel rollers mounted in the tread drivers. The load is distributed evenly and wear is minimized, as nine of these lugs and rollers are constantly in contact.

For unusually soft ground or otherwise difficult for traction, quick-detachable mud grousers are provided. These may be fitted to the tread in a few moments. They are furnished at a slight additional expense.

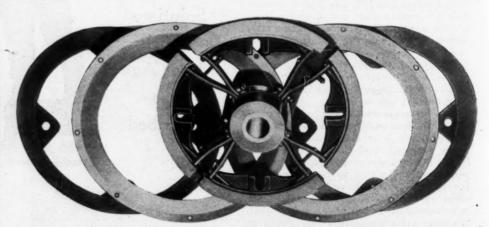
Each tread has two wheels, the rear one being the tread driver and the front one acting as an idler. The tread drivers are 36 in. in diameter and transmit the power through the rollers and master lugs on the grouser plates. The individual multiple-disk clutches controlling the tread drivers are incorporated within them. Both tread drivers are carried on the rear axle.

Each front tread wheel is mounted on a short shaft carried in 10-in. slots in each side of the steel tread truck frame. Heavy bolt adjustments are provided for taking up slack in the tread. These front wheels are of 30 in. diameter and are built with a double rim to provide free passage for the master lugs in the grouser plates as the treads revolve.

The length of the tread on the ground is

6 ft. To insure positive alignment, a series of double trolley wheels travels between the tread wheels. One set runs on the grouser plates outside the chains and there are two pairs of these trolley wheels between the two chains, straddling the driving lugs. The same construction is used on each tread and renders it impossible for the tread to be thrown off tread wheels or even twist sidewise. The tread is 15 in. wide, so its area on the ground is 2160 sq. in., insuring positive traction. An apron of armor steel % in. thick protects the entire tread truck assembly-tread wheels, trolley wheels and the tread chains on the ground. Between the tread wheels a large tool box is mounted conveniently on the tread truck frame at each side of the tractor. The tread truck frames are connected at the front by a heavy tie-bar and at the rear by a strong cross-plate mounted in conjunction with the arc-shaped drawbar. Double Suspension

To provide the double three-point suspension the main frame and powerplant form one unit and the tread assembly the other. In the main frame unit the front axle is pivoted at the center of the main frame and plate, each end resting on a powerful spiral spring mounted on the tread truck frames. As one of the treads surmounts an obstruction none of the resultant twisting, jarring effect is transmitted to the powerplant or to the



Trundaar tread drive clutch, showing wedge, driving and driven rings

tread, which can thus continue to exert maximum traction.

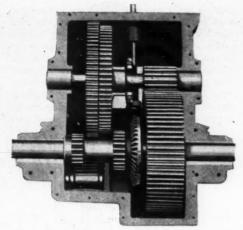
The heavy structural steel main frame carries the radiator, engine and flywheel, engine hood, 30-gal. fuel tank and, on a cross-bar in the rear, the driver's seat, control levers and pedal assembly. In the tread unit of the double three-point system the triangle is reversed, since the tread truck frames form the two points and the apex is at the rear.

Unusual freedom from mechanical troubles, ease of operation and accessibility are characteristics of the four-cylinder 4% by 6%-in. Buckeye-Waukesha engine used in the Trundaar. This is a special tractor design for the severe conditions and constant heavy loads of tractor service. It develops 52 brake horsepower. The crankshaft is of 2-in. diameter and the valves are 21/8 in., clear. Connecting-rod bearings are 2 by 3 in., and main bearings are: Front 2 by 3½ in.; center 2 by 4½ in; and rear 2 by 4% in. Piston pin bearings are 11/2 by 21/2 in. Camshaft diameter is 11/4 in. Timing gears are helical with 1-in. faces and 10 pitch. Three piston rings, 1/4 in. wide, are used in each cylinder. Waukesha governor is inclosed in the en-

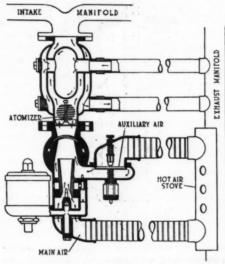
#### Ignition by Kingston

Ignition is by Kingston high-tension magneto, with impulse starter. Lubrication is constant level splash, with surplus oil reservoir and circulating pump. Cooling is by pump and fan, the large capacity radiator being designed for tractor work.

Besides reducing fuel cost, experimental work with the Trundaar tractor fitted with the Buckeye-Deppe integrator has shown, it is stated by the manufacturers, that this system prevents overheating the engine and dilution of the lubricating oil, eliminates carbon and minimizes spark plug trouble. This is said to be due to the fact that the integrator creates a homogeneous, dry, fixed, superheated gas instead of a wet mixture only partially vaporized. Combustion thus is rendered practically complete and instantaneous, resulting in in-



Transmission with cover plate removed



Section through Buckeye-Deppe integrator

creased power and thorough scavenging of the cylinders.

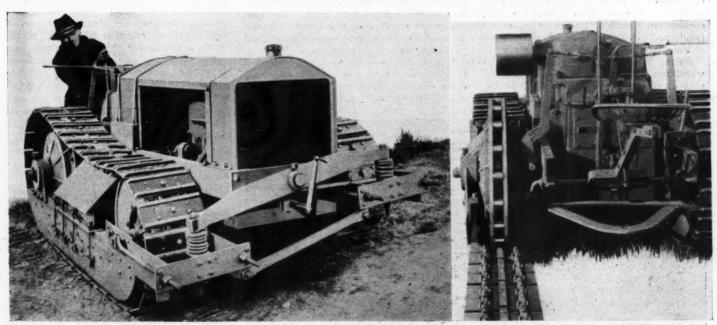
The main clutch, which delivers power from the engine to the transmission is a multiple-disk construction, running in oil.

One of the most interesting features of the Trundaar tractor is the design of the independent multiple-disk clutch controlling each tread drivers. It comprises the outside and inside halves of the tread driver, a driving wedge, two driving rings and two driven rings. Both clutches run in oil. Pulling the lever controlling either clutch withdraws the wedge ring from contact with the beveled-driven rings by releasing the tension exerted by a powerful compression spring. When the wedge ring is disengaged in this manner it stops the tread and driver on which it operates. On releasing the clutch lever the compression spring forces the wedge ring back into driving contact. With this method of control steering is simple and easy, as disengaging one clutch stops its tread and the tractor will turn completely around in a 30-ft. circle. To facilitate this operation and to render control positive a drum in each drive clutch housing carries an expanding brake of 24 in. diameter, lined with Thermoid.

#### Safety Is Provided

A 20 per cent margin of safety is provided in every part of the two-speed-andreverse transmission. It is a spur gear design, mounted on the rear axle, which is a 3-in. shaft turned from a solid bar of steel. The bevel gear and two primary reduction gears operate as a sleeve unit on the axle shaft, to which the main driving gear is keyed. The two secondary reduction gears and main driving gear pinion are mounted on the countershaft, which is of 21/2 in. diameter. A cam under the axle shaft carries the reverse idler pinion. A lever on a quadrant on the transmission case operates the shifter fork mechanism. The main driving gear and pinion have 51/2-in. faces and the reduction gears 2-in. faces, indicating the large safety factor.

On the transmission case is mounted the gearcase of the power pulley, which operates directly over the left tread driver. This unit is driven by inclosed chain and sprockets from the main driveshaft. The pulley is 10 in. in diameter and has an 8-



Flexibility in the Trundaar is provided by double three-point suspension. The tread drive with tread detached is shown at the right. Hardened steel rollers impart drive to master lugs on grouser plates

in. face. The belt may be applied from either front or rear and the necessary adjustment and belt tension may be secured very quickly without losing time in maneuvering.

Roller bearings are used for the countershaft of the transmission and outside main bearings on the tread drivers. Ball thrust types are used wherever any thrust and side stress occur. All bearings without internal lubrication are provided with grease cups.

All control levers and pedals are within easy reach of the operator, whose comfort further is increased by the spring-suspended seat an indication of how tractor engineering is profiting by motor car practice. The tractor weighs 9500 lb. and has a turning radius of 12 ft.

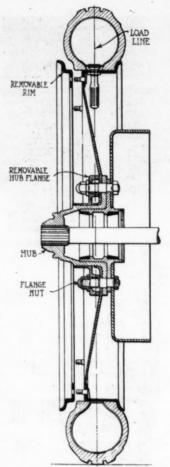
#### FEW PARTS IN DISTEEL

The Detroit Pressed Steel Co. disk wheels for passenger cars, trucks and tractors are composed of surprisingly few parts. The passenger car wheels are styled Disteel wheels and are of the single disk type, though those for trucks and tractors are single or dual disk. A cast steel hub fastens to the axle, and the pressed steel disk is secured to this, slipping over the four studs on the permanent flange. The wheel is located in place by a wheel-locking flange which carries the four nuts and their washers in a self-contained unit. Less force is required to remove or replace the wheel with this system than with one large nut holding the wheel in place.

The rim is integral with the dished steel flange and has an outer ring held in place by eleven nuts of the 34-in. type. This permits extreme line-in of parts without loss of strength and leaves the casing entirely free when removed. The disk and rim are ordinary 25-point carbon blue annealed steel, the flange varying in thickness from  $\frac{3}{16}$  to  $\frac{3}{32}$  in. The weight of the wheel is less than that of the universal of wood or wire.

The absolute rigidity of previous dual disk wheels is removed by the dished construction. The load line crosses the disk, eliminating a concentration at any definite point, and is carried both in compression and suspension over the entire surface.

Among the advantages claimed for the wheel are freedom from climatic effects, such as shrinking, swelling, cracking, etc., and the ability to endure shock without



Disteel wheel on 3/4 floating type rear axle

complete destruction and, if bent, to be straightened without much difficulty. As all the wheel is inside the tire tread, it is more protected from accident than either the wooden or wire wheel.

One previous objection to this wheel construction was that of appearance, and in this the Disteel wheel has removed much of the cause for complaint. The design harmonizes nicely with the present streamline body lines, and pleasing color contrasts are possible on the wheel construction. The disk effectively conceals all parts such as brakes, rods, etc.

The Detroit Pressed Steel Co. is equipped to manufacture wheels for the following cars: Cadillae, Packard, Murray, Winton, HAL, Dorris, Jordan, Hudson, Peerless McFarlan, Fergus, Olds, Hupp, King, Chalmers.

The cost is about the same as a universal wire wheel installation, that on the Cadillac and Packard being about \$130.

#### APPERSON ENGINE REDESIGNED

One of the features of the Apperson eight-cylinder engine is the design of the valve gear, which is actuated by one camshaft and two gears. This new construction has made possible the elimination of eighty parts over the design formerly used, which consisted of a bell crankboard to transfer the motion from the camshaft to the valves. This has been accomplished by redesigning the camshaft with one cam for each push rod and changing the angle of the valves and pushrods so that the center of the camshaft is in direct line with the center line of the valves and pushrods. The advantages of the construction are more positive valve action and the reduction of working parts.

### MASON CORD TIRE SOON Kent, Ohio, Dec. 10—The Mason Tire &

Rubber Co. will place a cord tire on the market in the early part of 1918 and will enter the truck tire field on a large scale. The treasurer's statement shows sales of \$1,200,000 and net profits of \$181,504.36 for the year. The balance to be placed in surplus amounts to \$104,330.22 after deductions for 1916 profit and loss amounting to \$23,328.08, income tax reserve of \$5,076.84, preferred dividends paid during 1917 and preferred dividend reserve totaling \$48,485.40. The surplus for the year amounts to very nearly 20 per cent on the common stock and would have exceeded 25 per cent except for the 1916 loss incurred during the first few months of operation of the plant, which started but ninety days before the closing of the 1916 fiscal vear.

#### TO PLATE ALUMINUM

New York, Dec. 7—The United Smelting & Aluminum Co., New Haven, Conn., has patented a process for electro-plating aluminum, similar to the standard process of electro-plating other metals, from which uniform results are obtainable. The process is equally applicable to pure aluminum in sheets, rods, wire, tubing, etc., and to aluminum alloyed with other metals, as in molded or die eastings.

#### ELECTRICS FOR ENGLAND

Chicago, Dec. 10—Communications from those of England in position to know show a favorable opportunity in that country for sales by American makers of electric vehicles after the war. It is only recently that this type of car has been able to gain much headway in England. The scarcity and high price of gasoline have caused the change. Many believe the price of gasoline will remain high even after hostilities cease. Coal gas has been employed a great deal by many, but the containers require so much space it is not thought that its use will ever rival strongly that of gasoline as a motor car fuel.

Several municipalities have been experimenting with heavy electrics and have found them very satisfactory. Birming-



Disteel wheels conform to present body design and conceal brake bands and rods

ham, in particular, is well fitted for the use of electrics. Not only is current cheap but within a 5-mile radius of the city are twenty-two charging stations, in addition to seven within the city.

#### ITALY NOW SECOND PRODUCER

Chicago, Dec. 7—Before on the list of motor car exporting nations, Italy was fifth, but since then conditions have changed enormously, and Italy is a very good second, with England third and France a poor fourth. Official figures, issued by the finance departments of the variout governments, show that America has increased her motor car exports 275 per cent; Italy has increased them 147 per cent; England has decreased by nearly 49 per cent, and France has decreased by nearly 91 per cent.

Italy's motor car business is being done by not more than ten motor car factories, and 80 per cent of it is being handled by Fiat, which, with a staff of 23,000 workers, is now the largest motor car producer in Europe.

#### NEW RUBBER SOURCE FOUND

Caracas, Venezuela, Nov. 7-A new source of rubber has been found in the forests of Hevea at the headwaters of the Orinoco and the Rio Negro rivers. Dr. Henry Pittier, botanist, states that there are large forests of the Para rubber tree in this region. The Hevea, or Para tree, is known to be by far the most important of all the rubber-bearing trees of the world. There has been much waste and destructive tapping of the wild trees in the upper Amazon, and the center of Hevea production has begun to pass to the East Indies, where extensive plantations have been established in the last twenty years. Professor Pittier says they are getting rubber in Northern and Central Venezuela from the Mierandra genus, one closely allied to Hevea. Labor conditions prevent much planting of rubber in Central and South America in competition with cheap coolie labor and easy living conditions in the East.

#### SCHIPPER TO ADDRESS SECTION

Cleveland, Ohio, Dec. 8—The program of the Cleveland section of the Society of Automotive Engineers here Dec. 21 will contain a talk by J. Edward Schipper, special Detroit representative of Automotive Industries, who will talk on what the public is demanding from the motor car engineer. Special reference will be made to the effects of the war on motor car design, and it is expected that there will be considerable discussion along the lines of purposed methods of lightening the weight and improving the performance of engine and chassis.

#### STANDARD AIRCRAFT FORMS

Elizabeth, N. J., Dec. 10—The Standard Aircraft Corp., which recently bought the John Stephenson Co. plant here and which also has a factory in Plainfield, N. J., has incorporated in New York with a capital of \$5,000,000, divided into \$2,000,000 preferred and \$3,000,000 common. Harry Bowers Mingle is president.

Employment of more than 8000 men and

women is expected in the new plant to take care of Government orders. The plant here covers 87 acres, and the main buildings have more than 300,000 sq. ft. floor space. There is also a 60-acre flying field and 5 acres of waterfront on which will be established the hydro-airplane hangars and test sheds. The plant represents an investment of more than \$1,000,000. In addition to the two main plants, the corporation has seven-smaller factories in which parts of airplanes are made. It is expected that sixty airplanes a week will be the normal output of the new corporation.

#### 1918 Stewart Line

THE 1918 line of the Stewart Motor Corp., Buffalo, N. Y., will consist of four models, a ¾-, 1, 1½- and 2-ton. They will be the same as the present ones except for a few changes. The prices are: ¾-ton, \$750; 1-ton, \$1,295; 1½-ton, \$1,695; and 2-ton, \$2,195.

The ¾-ton now uses a Milwaukee engine and the 1½-ton a Continental, while the two larger models remain Buda equipped. The bores and strokes are respectively, 3½ by 4¼, 3½ by 5½, 3¾ by 5, 4½ by 5½.

Standard parts are used such as Bush radiators, Detroit springs, Zenith carbureters and Berling magnetos. The smaller model has a dry-disk clutch made by the Mechanics Machine Co. and a unit gearbox from the same concern, while the steering gear is a C. A. S. The larger models have a Fuller dry-disk clutch, Fuller gearbox in unit with the engine and Ross steering gear.

Wheelbases are respectively 110, 118, 140, 156 in. Tires are 32 by 4, 34 by  $4\frac{1}{2}$ , 34 by 4. The last has duals in the rear.

women is expected in the new plant to take The first two are pneumatic. Gear ratios care of Government orders. The plant here are 6 to 1, 7 to 1, 9 to 1.

The 1½-in. the leader, reflects the characteristics of the line. The engine is a 35-hp. four-cylinder L-head design with three-bearing crankshaft. It has a constant level oiling system maintained by plunger pump. The powerplant is a unit with a dry-disk clutch and three-speed selective gearset, all suspended on three points. Ignition is by Berling high-tension magneto with fixed spark, and the carbureter is a vertical Zenith controlled by an accelerator. Cooling is by thermo-syphon with cast tank, armored radiator and 16-in. steel fan mounted on ball bearings.

The clutch is a dry-disk, Raybestos against steel, and drives a transmission with gears of double heat-treated nickel steel. Annular ball bearings are used throughout.

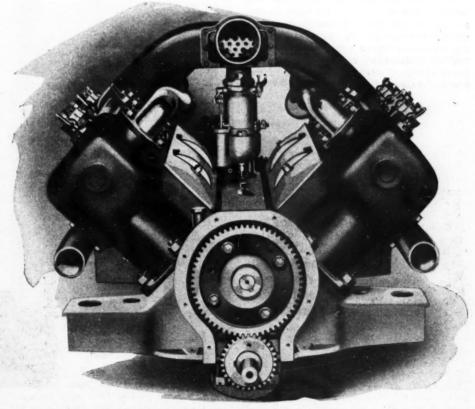
The drive shaft is tubular with two universals. The front axle is a drop-forged I-beam with nickel steel steering spindles, and large roller bearings in the hubs.

The frame is a straight side channel type heat-treated. The overall length is 204 in., depth 5½ in. and width 2½ in., making it suitable for 10-ft. bodies.

Artillery wheels are used with twelve spokes in front wheels and fourteen spokes in the rear. Firestone or United States solid pressed-on tires are used.

Brakes are external contracting. The service brake acts on the rear wheel drums and the emergency brake on the propeller shaft. Both bands are lined with Raybestos.

The chassis is painted standard Stewart red with fenders and running boards in black. Equipment includes driver's seat and cushion, side and rear oil lamps, channel bumper, mechanical horn, tool kit, tool box and front fenders.



The new Apperson eight-cylinder engine has eighty less parts

## The Accessory Orner

#### Victor Auxiliary Seats

THE Victor disappearing car seat is adaptable to all six- or seven-passenger sedans, limousines and touring cars and folds up in back of the driver's seat. One model is a disappearing auxiliary chair with arm rests which can be folded out of the way. The seats for touring cars are built to conform to the body lines.—American Auto Co., Morristown, N. J.

#### Terminal Machine Tools

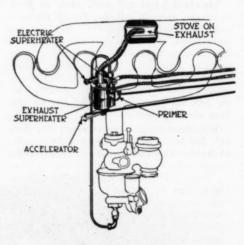
As a war time measure the Terminal Machine Co., 30 Church street, New York, has adopted a new method in describing its products for the public. It has prepared 100,000 copies of its catalog and announces it will mail future issues only to those who acknowledge receipt of this copy and ask to be placed on the permanent mailing list. Among the tools described are lathes, screw machines and turrets, grinders, shapers, presses, drills, millers and various miscellaney. Used tools also are listed.

#### Perpetual License Tag

A patent has been granted for a license tag designed to be used perpetually by the insertion each year of the timely indication that the license fee for the current year has been paid. The tag consists of a plate of the materials and size now used generally, provided with openings near the corners for permanent fastening devices whereby to fasten it to the car, with one or more slots at the upper edge through which attaching straps may be passed to comply with state or government regulations. On the face of the plate is the number of registration, the object of the tag being to permit a vehicle to retain the number permanently so that this part of the plate need never be changed. Near one end guides provide for the insert, on



Stewart speedometer for Ford closed cars



Perfection five-in-one vitalizer

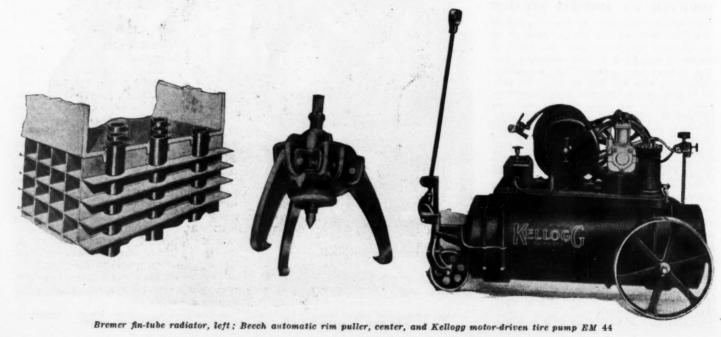
which may be displayed the number of the current license year and the name of the state. Provision is made to attach the insert with the same devices which attach the plate proper. With this design the license tag could be used indefinitely merely by changing the display surface from year to year, bringing about economy in registration, the purchase of tags and so on. The insert can be slipped into place without removing the tag from the car, and to distinguish the insert representing another year, different colors might be used as they are now in the entire tag.—R. F. Timmons, Coshocton, Ohio.

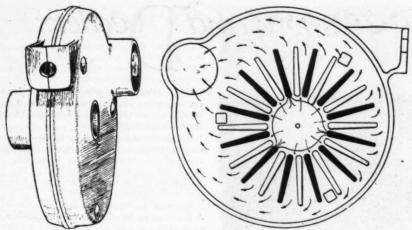
#### Perfection Vitalizer

The Perfection is called a five-in-one vitalizer. Warm gasoline vapor is supplied directly to the manifold for easy starting, the fuel being drawn from a pipe which replaces the drain cock on the bottom of the carbureter and heat being supplied by an electric heating coil. After the engine is started the current is switched off, and when the exhaust becomes hot warm air is drawn through an exhaust stove through a flexible pipe to the manifold, thus supplying heat for complete vaporization. The extra air also gives better economy. Price, \$10.—American Spring Tire Co., 30 West Lake street, Chicago.

#### Vacuum Exhaust Muffler

It is claimed for the Vacuum muffler that it will reduce the back pressure even below that obtained with an open exhaust pipe. The device is a radical design, small and light and, since it is made of cast iron, rattle free. Open passages prevent the collection of carbon. The gas from the engine enters the muffler through the center, and it expands as it moves out through the wedge-shaped passages to the discharge





Drawing of Vacuum muffler, indicating circulation of gas

opening on the circumference. It will be noted that each discharge of gas is broken up into twenty-four puffs by the twenty-four passages, and these puffs do not reach the opening at the same time but one after another so that noise of the explosion is broken entirely. This is due to the length of the path from each passage to the discharge opening of the muffler, which is different. Price, Ford size, \$3; others, \$6.—Vacuum Muffler Corp., Tribune building, New York.

#### Blood Winter Liquid

The freezing point of the Blood radiator liquid is 58 deg. below zero, and it boils at 374 deg. Fahr. It is said that it will not evaporate, act on metal, cloth or rubber, is uniform in strength and needs no care after it is put in the radiator. The liquid contains no calcium chloride or other inorganic salt. Price, \$1.50 a gallon or \$12 a dozen gallons.—T. L. Blood & Co., St. Paul, Minn.

#### Automatic Rim Puller

The Beech automatic rim puller is a three-legged adjustable device in which turning a screw not only applies a pulling force but draws the jaws inward. The puller is furnished with two sets of jaws, 7½-in. opening to 10 in. and 12-in. opening to 18 in. Price, \$15.—Greb Co., Boston, Mass.

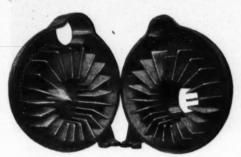
#### **Underslinging Fords**

With the Dominick underslinging equipment for Ford cars the body, the rear mudguards, aprons and mufflers are removed. The frame is sawed at a point 13 in. from the rear springs, and plates which drop the frame 2, 3 or 4 in. as desired are attached. The process is repeated with the front of the car. A japanned plate is furnished to attach the mudguards, and a hole is cut in the floor in the rear to accommodate the rear springs. Price, \$20.

—William Dominick & Co., 1607 Prairie avenue, Chicago.

#### Stewart Ford Speedometer

The Stewart speedometer for Ford sedans and coupelets combines the best features of the regular model but is furnished with special flange for installation on inclosed cars which do not carry instrument boards. The plate is installed on the cowl by two



Photograph of Vacuum exhaust muffler



Timmons perpetual license tag

screws. It is not necessary to alter the car in any way. The device is built on the magnetic type, with 60-mile capacity rotating speed dial. The Stewart odometer consists of 100,000-mile season register and

100-mile trip register. The trip register can be reset to any mile or tenth of a mile without disturbing the season register. Price, \$11.25—Stewart-Warner Speedometer Corp., Chicago.

#### Rynehard Al Rim Tool

The Rynehard Al rim tool is a split-rim contractor operated by a turnbuckle in the center and also may be used to expand the rim. Price, \$3.50.—Rynehard Rim Tool Co., 19 Fulton street, Brooklyn, N. Y.

#### Bremer Radiator

The Bremer radiator is a fin-tube type, and is the product of five years of exclusive radiator building. The header plate is flanged to give a long, perfect contact with the tubes, making the sheet metal construction as sturdy as the heavy bolted plates. A 21/2-in. core is used with plate headers 3-in. thick and 8-in. wide. The illustration shows the principle of the construction, in which the tubes are protected against any injury except the most violent impact. By the straight, round-tube build clogging, the most common trouble and cause of complaint in radiation, is eliminated entirely, it is claimed. -Bremer Mfg. Co., Forquer and Canal streets, Chicago.

#### Peters Crankshaft Grinder

The Peters crankshaft grinder is a tool for returning crankshaft journals and will take crankshafts up to 21/2 in. in diameter. A lathe is not required. Four perfectly aligned hardened-steel plates, the faces of which are keen-cutting edges, are linked together by hardened-steel pins. connect to steel handles equipped with adjusting micrometer screws. The tool is placed around the shaft by removing a pin, and the adjusting screw is set until the jaws lock over the shaft. By turning the tool all uneven spots are cut away, and a perfectly smooth and true surface is obtained. Price, \$17.50.—Peters Engineering Co., 3203 Chestnut street, Philadelphia, Pa.

#### Kellogg Garage Pump

Among the pumps made by Kellogg is one for medium-sized garages, the EM 44, which has a working pressure of 400 lb. per square inch and fills approximately six 34 by 4 tires from flat to 80 lb. without refilling. The air is filtered, and an automatic cut-out is fitted. Pumps are standard with 110 and 220-volt direct current motors; 110 and 220-volt, 60-cycle, single phase, alternating current motors. With this pump is 100 ft. of protected electric cable ready for attachment to electric socket and 15 ft. of air hose with a pressure gage. The motor is 1/4 hp. alternating or direct current, and the pump is a heavyduty, four-cylinder, air-cooled, 1% by 11/6 with a capacity of 1.6 cu. ft. free air a minute. Shaft and eccentric cams are drop forged; cylinders, gray cylinder iron; piston fitted with three metal rings; bearings at each end of shaft Babbitt. Price, \$165 for direct current and \$175 for alternating current.-Kellogg Mfg. Co., Rochester,

# Among the Makers and Dealers



FORD PLUS TRACFORD PLOWING GROUND—Here is a photograph of the Tracford tractor attachment in operation. In general, it is said to be equivalent to three horses

CRANE Becomes Racine Division Manager
—R. B. Crane has been appointed manager of the sundry division of the Racine
Rubber Co., Racine, Wis. Mr. Crane formerly was sales manager of the Double
Fabric Tire Co.

Blackley Leaves Chase Truck—B. E. Blackley has resigned as general sales manager of the Chase Motor Truck Co., Syracuse, N. Y., to direct the sales and advertising of the Larrabee-Deyo Motor Truck Co., Binghamton, N. Y.

Sebring Tire Increases Capacity—Two new buildings and an addition to the main building will be erected by the Sebring Tire & Rubber Co., Alliance, Ohio, to increase the capacity of the plant from 150 to 500 tires a day. It is expected that these buildings will be completed by Feb. 1.

Braden Back with Standard Parts—James A. Braden is again advertising manager of the Standard Parts Co., succeeding B. L. Dodge, who has joined the McNaull Tire Co. Mr. Braden, who is an old Diamond Rubber man, was in charge of Standards Parts publicity prior to August, when illness temporarily disabled him.

Dart Truck Appoints Representatives—The Dart Motor Truck Co., Waterloo, Iowa, has appointed three new district representatives. W. A. Baxter, recently with Maxfer, Chicago, will take charge of New York, Eastern Pennsylvania and New England; E. W. Brooks, formerly with the Available Motor Truck Co., Illinois, Indiana, Ohio and Western Pennsylvania; and S. B. Knudson, Iowa, Missouri, Kansas and Nebraska.

Falls Motors Gives Men to Service—The Falls Motors Corp., Sheboygan Falls, Wis., has hung out a service flag containing forty stars, each representing an employe now in the military service of the United States. The company has entered industrial exemption claims only in cases where the selective service act takes men who are especially skilled and thus more or less indispensable in the work of building engines for the Government. As a result of a promise made before the Rotary Club of Sheboygan, Angelo R.

Oming Motor

Events

#### MEETINGS

Jan.	7-8—New York, National Automo- bile Dealers' Association, board of directors and east- ern vice-presidents' meeting.
Jan.	10-New York, S. A. E., Automotive dinner at Hotel Bilt-more.
Jan.	11-16—New York, National Association of Automobile Accessory Jobbers, convention.
Feb.	1—Chicago, S. A. E., winter meet- ing.
Feb.	1-Chicago, S. A. E., War dinner

#### SHOWS

	0110110	
Jan.	5-12-New York.	
Jan.	9-27—Cleveland, Ohio.	
Jan.	11-18—Washington, D. C.	
Jan.	11-19-Providence, R. I.	
Jan.	14-19-Rochester, N. Y.	
Jan.	16-22-Milwaukee, Wis.	
Jan.	19-26-Montreal, Canada.	
Jan.	19-27-Cleveland, Ohio.	
Jan.	21-26-Scranton, Pa.	
Jan.	21-26-York, Pa.	
Jan.	21-26-Portland, Ore.	
Jan.	21-28-Wilmington, Del.	
Jan.	22-26-Baltimore, Md.	
Jan.	26-29—Quincy, III.	
Jan.	26-Feb. 2-Chicago.	
Jan.	26-Feb. 2-Harrisburg, Pa.	
Feb.	2-9-Minneapolis, Minn.	
Feb.	5-9- Binghamton, N. Y.	
Feb.	9-16-Kansas City, Mo.	
Feb.	11-16-Kansas City, Mo.	
Feb.	11-16-St. Louis, Mo.	
Feb.		
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Feb.	18-23-Springfield, Ohio.	
Feb.	18-23-Des Moines, Iowa.	
Feb.	18-25-Pittsfield, Mass.	
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Marc		
	h 20-23-Trenton, N. J.	
Apri		

Clas, secretary of the Falls company, is writing one letter each week to each of the forty men in the service to let them know that they have not been forgotten.

Seiden Truck Elects Officers—George C. Gordon has been elected president and treasurer of the Selden Truck Sales Co. The other officers are: W. C. Barry, Jr., vice-president; E. B. Osborn, assistant treasurer, and R. H. Salmons, secretary.

Hunting to Represent General Asbestos— J. P. Hunting has been appointed special representative in charge of equipment sales for the General Asbestos & Rubber Co., Charleston, S. C., with headquarters in Cleveland, Ohio. Mr. Hunting has been connected with the industry for twelve years.

Closed Branch Follows Army Enlistment—R. S. Whiteside, branch manager of the Hess-Bright Co., Philadelphia, and his assistant, G. L. Jenks, have enlisted in the aviation section of the U. S. Army. On account of this the retail branch of the company in Philadelphia has been closed. The business formerly carried on there will be taken care of by the Hess-Bright Mfg. Co. from the factory.

Doss to Build Atlanta Plant—The Doss Rubber & Tire Co. will build a new tire factory at Atlanta, Ga., near Fort McPherson. A building is now under construction, and others will be added from time to time. The factory will have a capacity of 1000 tubes and casings a day when the entire equipment is in place. The company was organized a short time ago with a capital of \$1,000,000. The tube is said to be puncture proof and is called self-healing, its structure sealing a hole instantly.

Goodrich Promotes Branch Men—War exigencies are bringing promotions and changes in the branches of the B. F. Goodrich Rubber Co. E. D. Yount has been appointed manager at South Bend, Ind., succeeding W. W. Vandeever, who has been transferred to the Goodrich sales school. J. W. Moore has been made manager at Fort Worth, Tex.; F. S. McNaul, Hutchinson, Kan.; W. J. Balaun, Waco, Tex.; W. J. Reuter, Oklahoma City, Okla.; W. F. Burbank, San Diego, Cal.; S. S. Clark, Salina, Kan., and T. B. Graham, Seattle, Wash.

Federal Truck Continues to Add—The Federal Motor Truck Co. is to construct a two-story brick and steel factory 95 by 308 by 34 ft. to cost approximately \$45,000. This is a continuation of the general expansion that has been made in the last year to care for increased production. Recently a large addition was built for office purposes and upon completion immediately was turned over to production. Although it has not been announced definitely it is expected that a large part of the new factory will be used for the Government work, as this company is working on class B trucks.

Dealers Co-operate in Booming Truck—Twelve Cleveland, Ohio, truck dealers have combined in a co-operative advertising scheme for emphasizing the value of the truck in relieving the freight car shortage and in cutting down the cost of doing business. An advertising campaign is carried in the local papers, comprising full page spreads and headed "Buy your motor truck now," followed by eleven reasons why now is the best time to purchase a truck, signed by the twelve dealers. No mention is made of any particular truck in the way of a sales argument

for that truck, the name of the truck simply being listed after the name and address of the dealer.

Winton Sells Limousines to French—The Winton Co. has sold 125 limousines to the French government. Of these fifty are practically ready for shipment, and the balance will be completed as soon as possible.

Piling Is Hupp District Manager—Frank W. Piling, former eastern district supervisor for the Liberty Motor Car Co., has become district sales manager of the Hupp Motor Car Corp. in the Middle West. His headquarters are in Detroit.

Fickel Is Promoted by Mason—Anthony Fickel, manager of the Cleveland, Ohio, branch of the Mason Tire & Rubber Co., has been appointed manager of the New York branch. W. S. Steiss, formerly manager of the Akron branch, succeeds him at Cleveland.

Ware in Smith Signal Office—Robert L. Ware has been elected vice-president and treasurer of the Smith Signal Corp., New York. He will supervise the sales and advertising of the Smith signal and the other devices which this company plans to market. They will be exhibited at the New York show.

1414 Service Stars for Goodrich—Services were held at the unfurling of the B. F. Goodrich Co. service flag. This flag is marked with 1414 stars, of which 827 represent factory employees, 157 of those from the general or factory offices and 430 men from the branches or depots throughout the country. The flag measures 20 by 35 ft. and is spread across the main gateway.

Tractor Dealer Conducts School—The Banting Machine Co., tractor dealer, Toledo, Ohio, is conducting a school for educating the dealer and farmer in the advantages of the farm tractor. At the first meeting nearly 100 dealers and farmers from this section were in attendance. Service Manager Van Balkenberg of the Avery Tractor Co., Indianapolis, Ind., was instructor. It is planned to conduct this school at regular intervals.

Single Business in Dort of \$1,500,000—The Ohio Wholesale Auto Co., Toledo, Ohio, has been incorporated to take over the business of the F. R. Mitchell Co. The new company will be state distributor for the Dort and the transaction is said to represent a business of more than \$1,500,000 in Dort cars for the coming year. No cars will be sold at retail, though arrangements will be made for retailing Dort cars in Toledo. Agencies have been established in Cleveland, Cincinnati, Dayton and Columbus, and others will be established as soon as possible. The officers of the company are: George W. Barnes,



A FLAG OF 1544 PATRIOTS—This service flag has 1544 stars. It flies from the United States Rubber Co. building in New York, and stars are added each week as more men enlist

Muskogee, Okla., president; Lee Beeler, vice-president and general manager, and C. W. Smith, secretary.

Schermack Wheel Co. Reorganizes—The Schermack Wheel Co., Detroit, has changed its name to the Dematti Wheel Co. and increased its capitalization from \$1,000 to \$100,000.

Noble Now With Liberty—Cliff Noble, formerly with the advertising department of the Hyatt Roller Bearing Co., is now connected with the advertising department of the Liberty Motor Ca. Co.

Dodge Brothers Install Railway—Dodge Brothers is installing a complete industrial railway, encircling its plants, to reduce trucking costs. This system is of a narrow gage type and joins most of the ground floor departments. In all 8400 ft. of track have been installed, and the new buildings under construction will require 5000 ft. more. The rolling stock comprises six locomotives and 108 flat cars, all manufactured in the plant. The locomotives are driven by a standard Dodge Brothers engine and have three speeds

forward and ahead. They run on regular schedules and in one instance carried seventeen cars of material weighing 90,000 lb.

Kearney Will Represent Graham—John M. Kearney, connected with the Willys-Overland Co., New York, has resigned to become special representative of the Graham Brothers Sales Co., New York.

Sommer Becomes Allen General Manager— L. A. Sommer has been appointed vice-president and assistant general manager of the Allen Motor Co., Fostoria, Ohio, in charge of engineering and production.

G. V. Electric Trucks to Be Continued— The General Vehicle Co. will continue the manufacture of electric trucks notwithstanding the fact that a considerable portion of the Long Island plant will be devoted to other work.

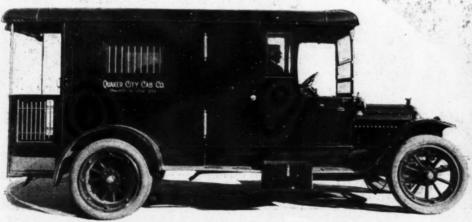
Takes on Rudge-Whitworth Wheels—The Bearings Co. of Pennsylvania, Philadelphia, Pa., has taken on the sales of Rudge-Whitworth wire wheels with jurisdiction over the service in New York, Philadelphia, Baltimore and Washington.

Fahrig Metal Opens New Plant—The Fahrig Metal Co. has opened its new plant at Jersey City, N. J. The company will continue manufacturing the Fahrig anti-friction metal in the New York plant. The new plant will enable the company to double its production.

Peoria Tractor Co. Reorganizes—The Peoria Tractor Co., Peoria, Ill., has been reorganized and the capital stock increased to \$1,500,000. The plant will be enlarged to permit the construction of 2000 tractors a year. An order for 300 has been obtained from the British government.

Industrial Foundry Booked Six Months—The Industrial Foundry Co., St. John, Mich., has substantial contracts with the General Motors Co. and is stated to have enough work booked for six months' steady operation. Since May one addition, 40 by 105 ft., another 32 by 35 ft., and another 20 by 30 ft. have been completed, and further expansion is planned. The capacity of the plant is 10 tons of metal daily.

Boston Dealers Award Prizes—The C. S. Henshaw Co., Boston, agent for Dodge Brothers cars in eastern Massachusetts, celebrated its third anniversary with a banquet at which prizes were awarded to the winners of the salesmanship contest begun some time ago. The contest was open to salesmen in any Dodge Brothers organization, but only those of the Boston, Worcester, Brockton and Salem agencies took part. Diamond-studded medals showing a Dodge Brothers radiator, gold trophies and cash bonuses were awarded.





TRUCK COLLECTS DEPOSITS AFTER BANKING HOURS—Here is a portable bank mounted on a White chassis used for collections after banking hours. A safe insures safe-keeping. The service is given by a Philadelphia taxi concern

## From the Tour Winds

D ETROIT Club Elects Officers—At a meeting of the Detroit Automobile Club the following officers were elected for the coming year: W. E. Metzger, president; Edward N. Hines, first vice-president; G. Ed. Bleil, second vice-president; Thomas P. Henry, third vice-president; W. B. Bachman, secretary; J. Lee Barnett, treasurer.

Fifth Avenue Bus Net \$582,636—The Fifth Avenue Coach Co., New York, in the fiscal year ended June 30, earned a net of \$582,636, an increase of \$139,539. The amount collected in 10-cent fares was \$2,208,076. The number of passengers carried during the year was \$22,080,760, compared with 16,223,042 in the previous year.

Montreal May Have Only Canadian Show—The National Motor Show of Eastern Canada will be held at Montreal during the week of Jan. 28, and it is expected that it will be the only show held in Canada this season. If this is the case, it may be the only show in the British Empire. All positions on the show staff will be filled by returned soldiers.

Goodyear Drills Its Employees—So that its employees can escape some of the severe initiatory knocks raw recruits go through at training camps, the Goodyear Tire & Rubber Co., Akron, Ohio, has formed drill classes for all men of draft age. A United States retired army officer is in charge of the work. Any employee may join, though the classes are primarily for those who are subject to call for military service.

Detroit Paves Way for Buses—Traffic congestion on Detroit surface trolley lines is expected to be relieved by the use of motor bus lines on the main streets. At present an ordinance is being drafted to permit buses to be operated on Woodward avenue, John R. street, North Grand boulevard, Hamilton boulevard and several others. By this ordinance a \$1 license fee and a \$500 bond are

required for each bus, and the field is left open to any who desire to enter. A 10-cent fare is prescribed.

Gives Third of Bridges Cost—Middletown, Conn., has a public-spirited citizen who is contributing a third of the cost of a new concrete bridge abutting on his property. The old iron bridge had outlived its usefulness, and the citizen wanted to see a new one in place of it and in an endeavor to force the issue offered to pay a share of the cost, Middletown and the state pay the balance. The bridge, of concrete, 23 ft. wide, will be open for traffic soon.

Found—Another Meanest Man—In the old Grand Union Hotel washroom in New York City there used to be a sign to the effect that doubtless the meanest man in the United States visited that hostelry some time during the year and that if apprehended a warm reception awaited him, etc. A Hartford, Conn., car owner who saw the sign says he has been the victim of the meanest man in the United States. Recently he left his car standing in a vacant place near the police station thinking it was safer there than anywhere else. When he returned the car would not start. The gasoline tank was drained dry.

Hartford Goes After Headlight Offenders-The police force at Hartford, Conn., took in a tidy sum this week as a result of the activity of the police in enforcing the light law. One day twenty-four motor car drivers were fined \$18.42 each; the day following fifteen were taxed. An accessory dealer drove his car up to his door, got out of the car, allowing the engine to idle, opened the doors of his establishment and switched on the lights. When he returned to the curb the engine had stalled and a policeman who had been standing in the doorway on the opposite side of the street notified the owner to appear in court. The police are going after all kinds of vehicles on the light question, bicycles and horse wagons included. Up to date the motor car owners have been the alleged offenders. Hartford is said to be the strictest in the enforcement of any city in the state.

H. F. Dodge Offers Second Yacht—H. F. Dodge of Dodge Brothers has given two yachts to the Government. At the beginning of the war a small yacht, the Nokomis, was turned over for patrol duty. A newer and larger yacht was constructed, 582 tons, 243 ft. over-all, with 35-ft. beam, and this likewise has been given to the Government.

Akron Postpones Motor Show—The Akron Automobile Dealers' Association has decided to postpone its annual show until early spring. It was the opinion of the dealers that, as the newest models are held for the Chicago and New York shows, a show held later would be more complete. The show formerly was scheduled for from Dec. 3 to 8.

Novel Way to Catch Speeders—Sheriff W. F. Reynolds of Dallas, Tex., has worked out a new scheme to catch speeders. The plan is to get local distributors to donate two days each week a high-powered car with which to chase these speeders. Nearly every concern dealing in high-powered cars came to the sheriff's rescue and offered him a car for two days each week in turn. As a result more than twenty drivers have been forced to pay the fines and costs.

Urges Community Tractors for Farms—The Pennsylvania secretary of agriculture, Charles E. Patton, is urging the use of community tractors as a means of overcoming the labor shortage in farm work. He recommends that all chambers of commerce and similar organizations immediately take steps to secure tractors and during the winter plan schedules whereby farmers in each section can have their work done, even to the extent of working day and night. It is the potato, corn and grain crops that are in most danger.



A ROAD SUCH AS DREAMS ARE MADE OF—A highway like this one, which is in Cuyahoga County, Ohio, would be of much benefit in transporting troops and ammunition by motor trucks as necessary

### Nine Superb Body Styles An Aid to Greater Sales

VELIE dealers find the splendid new models give them exceptional sales opportunities. With the addition of a stunning Sport Model and distinctive improvements in other body styles the Biltwel line now represents the finest the market offers at anywhere near the Velie's price.

The famous Velie body builders have recorded a new achievement. Every motor car enthusiast will appreciate the aristocratic lines, smart upholstery, choice coach finish, and wealth of refinement in those little details which please and satisfy and which experience only can produce.

Velie performance — power, speed, flexibility, quick acceleration and low gasoline consumption, result from the famous Velie features — Red Seal Continental motor, Timken axles and bearings, perfect ignition, and many others of equal standard.

Here is power, economy and comfort to satisfy the hardest to please. Nine body styles give a range of choice for every need.

The Velie Dealer Proposition is one of golden opportunity, it wins in service and in trade building possibilities. The prices are right—the car is right. If your territory is open investigate at once.

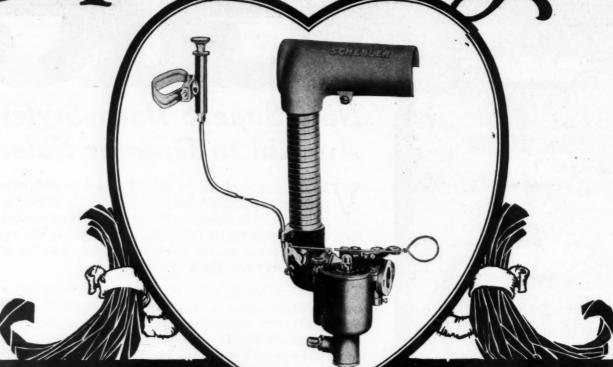
VELIE MOTORS CORPORATION
113 Velie Place Moline, Illinois

Builders of Automobiles, Motor Trucks and Tractors



When Writing to Advertisers, Please Mention Motor Age

Announcing



SCHEIBLER VALVELESS CARBURETOR for FORD CARS

NO MOVING PARTS BUT THE THROTTLE—BUILT ON SCIENTIFIC PRINCIPLES—DEVELOPS THE MAXIMUM POWER OF THE MOTOR—USES MINIMUM FUEL—WE DO NOT CLAIM THIS CARBURETOR "IS AS GOOD."

WE GUARANTEE ITS SUPERIORITY TO ANY OTHER CARBURETOR MANUFACTURED.

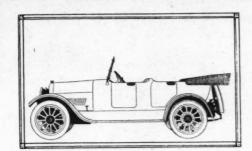
Write for prices and full particulars.

WHEELER-SCHEBLER CARBURETOR CO., Inc.

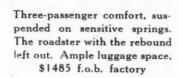
Perfected Overhead Valve Engine

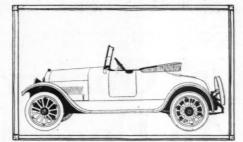
### STEPHENS Salient Six

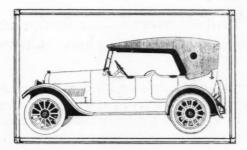
Burns All The Gasoline



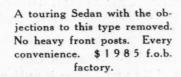
A proved Car. Unquestionably the most advanced engineering achievement of the present day. Five passengers, \$1485 f.o.b. factory

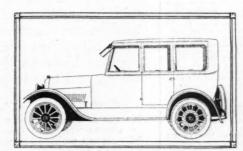




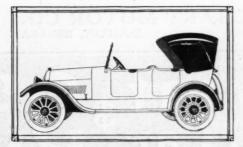


Having an adaptation of the popular low and narrow lines, yet with a Stephens individuality. Four passengers, \$1550 f.o.b. factory.







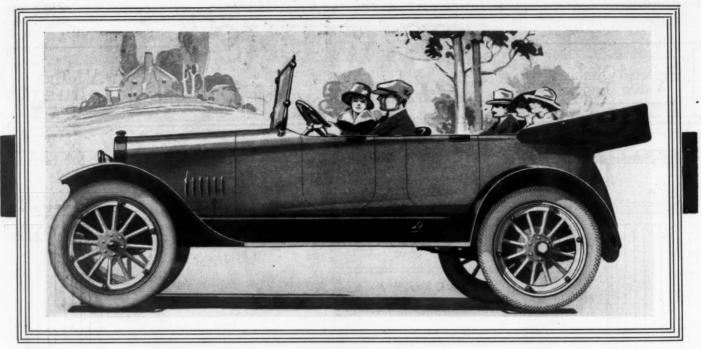


An expensively fitted and harmoniously designed Victoria top on the standard touring car. \$1660 f.o.b. factory.

Stephens Motor Branch of Moline Plow Co.

Moline, Illinois
Factory: Freeport, Illinois





### Unusual Quality At An Unusual Price

THE new 1918 Crow-Elkhart Multi-Powered Car is the unusual car of the year. It represents an advance in value. Unusual in the face of so many price advances.

One demonstration will sell it. Just the touch of thumb and index finger turns the steering wheel. The slightest pressure releases the clutch. You will find it an amaz-

colors, and two upholstery options.

ingly easy car to handle-all controls moving almost automatically.

Note the host of selling features in the 10-Year Chassis with its greatly improved method of transmitting power and its dominant improvements. You can offer 114-inch wheelbase, Multi-Powered Motor (Unit Plant), 10-Year Chassis, Stewart Vacuum System, Hotchkiss Drive, choice of ten

**Brief Specifications:** 

Motor—Multi-powered; bore 3½ in. and stroke 5 in.; large valves; bearings extra long; removable cylinder head; 3-point suspension. Lubrication—Splash constant level system with oil pump. Splash constant level system with oil pump. Caeling—Thermo-syshon with large water jacket; large heavy-bear system with oil pump. Caeling—Thermo-syshon with large water jacket; large heavy-bear search of the system of the

Reserve Territory on this Much-Wanted Car

It's the greatest light car value of the year. There is nothing to approach it. No other car gives so much for the money. The money making opportunity it carries is tremendous. Your territory may be open and you may not know it. or better still, Wire!

CROW-ELKHART MOTOR CO. Dept. 77 ELKHART, INDIANA

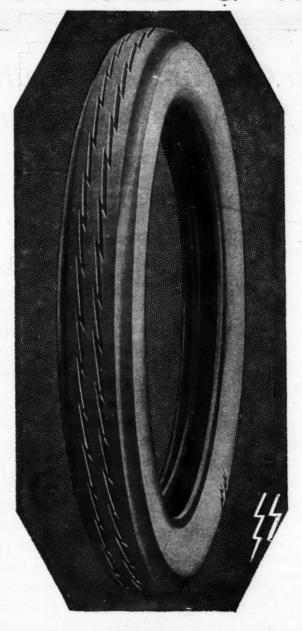


### JUST NOW READY A NEW TIRE MADE IN AN ASTONISHING WAY

Scores of strange machines are busy in a new factory, building America's newest tire creation, the Carlisle Cord Tire.

No man ever before saw machines like these. They weave the carcass of a tire from sturdy cotton rope. This rope they neither cut nor break. The carcass is formed in one continuous strand. And the machines are so incredibly efficient that they build a tire carcass far quicker than any other existing machines.

The new creation in pneumatic tires is just now ready. Dealers stand amazed when they inspect the tire.



It is resilient to a new degree; can withstand almost any punishment without bruise or damage; and a casing of the new type can be expected to out-travel other pneumatics 40 to 80 per cent.

One strand of the cotton rope supported 235 pounds of pig iron on test.

Few dealers ever dreamed the rubber industry would produce such a tire. But now that the sensational tire is perfected they can well imagine what a prize it is for a dealer.

Make application quickly if interested in a dealership.



# STANLEY

STEAM 22 nd CAR



The Power That Moves the World

### We Guarantee Something Vital— Not Merely Materials and Labor

We guarantee not merely that the Stanley has no carburetor troubles—but that it has no carburetor.

Not merely that it has no ignition troubles—but that it has no ignition system.

Not merely that it has no clutch troubles—but that it has no clutch.

Not merely that it has no gearshift troubles—but that it has no gears to shift.

Not merely that it has no selfstarter troubles—but that it has no self-starter; it naturally and actually starts itself with its own power, without the necessity of an extraneous contrivance.

Not merely that it has no substitute devices to perform the functions of these—but that there are no such functions to perform. The functions themselves are simply not a part of the Stanley, and could not conceivably be a part of the Stanley.

#### **But Greater Than That**

is the performance of the Stanley, whose liquid fuel (which is kerosene) is converted, not into mere instantaneously dissipated power, but into steam which is stored in advance.

The "pick-up" of the Stanley—its response in emergency and danger—does not wait for the power to be built up into a fly-wheel; the power is stored in advance, to be instantaneously delivered to the driving wheels—

### And There Are No Gears to Shift!

Heretofore when you have come to emergencies—in city traffic, in rough going, at blind corners, on unexpected hills—you have always done what your car wanted you to do, because you have been limited to the power in the fly wheel. With the performance of the Stanley at your command, the car does what you want it to do—precisely what you want, and precisely when you want it, and with not a single controlling device except the finger throttle.



When Writing to Advertisers, Please Mention Motor Age

### You Want a Car With Stanley Performance

—that is why you are selling, or are thinking of selling a car with 6 or 8 or 12 cylinders and 3000 or more revolutions a minute, which means 18,000 or 36,000 piston revolutions a minute.

You and your customers have been led to believe that the only way you can get the performance you want is by multiplying the cylinders and increasing the fly-wheel speed.

The Stanley—with only 32 moving parts, only 2 cylinders, and only 900 to 1,350

piston revolutions a minute—will prove to you that this belief is erroneous.

As a matter of fact, haven't you ignored the Stanley, largely because it is unconventional, or because your neighbor does not have one, or because we have never brought it forcibly to your attention?

### You Experienced Dealers

—you have sold automobiles of the very highest grade you who realize that the limits of the internal explosive engine have been reached and do not even now yield your customers the performance they demand, and must have —we want you to know this Stanley performance, to realize that the ideals they have been longing for are here—now!

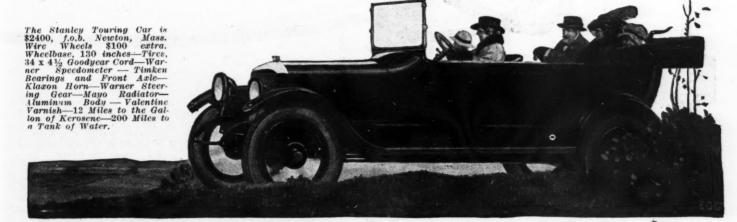
You can never appreciate what the Stanley means to an experienced motorist like

yourself without personally driving the car.

You don't want to miss getting your customers exactly what they have been longing for, by overlooking the Stanley, do you? We shall be glad to hear from you, and to send our booklet.

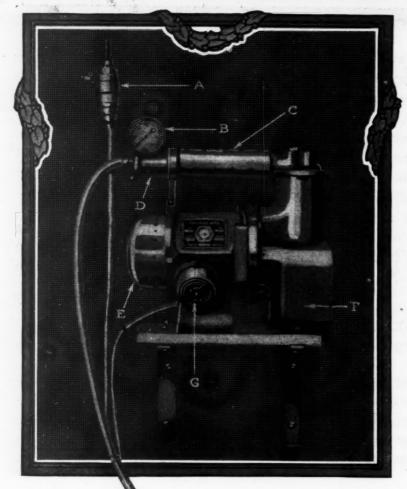
#### STANLEY MOTOR CARRIAGE COMPANY

NEWTON, MASSACHUSETTS



When Writing to Advertisers, Please Mention Motor Age





#### A SCIENTIFICALLY CONSTRUCTED SELF-CONTAINED "MOTOR AND COMPRESSOR"

A LECTROFLATER Electric Air Compressor is as scientifically designed, as accurately built and as carefully manufactured as a high grade automobile engine.

That's why LECTROFLATER Pumps wear years longer and give such greater all round satisfaction.

They are the most powerful, most capable air pumps of their size in the world.

They are built for hard service, are virtually trouble proof, have an operating expense that is negligible and are guaranteed to pump only cool, clean, dry air.

#### Note These Features:

A. Operates from any electric light socket, special compensating windings, uses either alternating or direct current, a big advan-tage should you ever move where the form of current is differ-

B. Accurate automatic air gauge, which shows pressure in tire before, during and after inflation.

Condensing chamber, which abstracts all moisture from the air; also serves as handle when pump is carried.

Water trap-the condensed water gathers in this trap and can be withdrawn at will.

Patented automatic forced draught air

cooling system, ultra efficient. Pump can be run continuously without heating.

Lubrication by capillary attraction. Grease—not oil—is used. No oil level to maintain. No oil spray to ruin tires.

G. Handy switch button for starting or stopping motor.

H. The complete unitelectric motor and compressor — is selfcontained in a single housing. No exposed working parts, either electrical or mechanical—no exposed gears, shafts, chains or belts. The outfit comes completeready for work as soon as unpacked.

> D Dis

#### BLACK THE

111 Pratt Street, Baltimore, Md. U. S. A.



No. 2 Portable Tank Outfit. Easy to push around. Very popular in large garages and



DEALERS and JOBBERS

state for him.

Every garage man, every tire man, machine shop, fleet owner and car dealer needs air service—the better, cheaper and more lasting the service

the better for him.

These men are quick to appreciate the superiority of the Lectroflater line. Not only does it permit of a wider selection but the quality of the product plus the many exclusive features insure quick sales and satisfied customers.

We are completing arrangements NOW for distribution through established jobbers and dealers. Discounts and catalogue elec-trotypes will be furnished reputable distributors upon request.

#### MILES of COOL, CLEAN, DRY AIR, CHEAP

Your modern dealer and garage man has learned the value of cleanliness. He has learned to conserve space, to eliminate unnecessary noise, to value his time, to stop leaks that cost money.

That's why LECTROFLATER Electric Air Compressors are displacing so many old-style pumps—cumbersome, unsightly, expensive-to-operate pumps.

LECTROFLATER Pumps save space because they are small and compact in size-built on the idea of an electric drill. Yet they are quicker and more powerful and have a greater capacity than most ordinary pumps three times their size.

A LECTROFLATER Pump IS economical It soon saves its cost in current. It will inflate ten tires from 40 to 80 lbs. pressure at a cost of one cent. That means 100 tires at a cost of one ten cents, or a thousand tires at a cost of one dollar.

It IS quick. It saves time—your time and the customer's time. It will inflate a 33 x 4 tire from flat to full pressure in 2 minutes.

It is clean. There is no place for dirt to gather. All working parts are self contained under a single metal housing free of crevices and sharp corners. It is clean cut in appearance. It is clean working and relatively quiet in operation. And what is most important of all it delivers clean air to the tire, air that is free from oil spray and moisture.

It IS handy—since it is small. It can be carried about like a satchel. To operate merely connect the cord to any electric light socket and turn the switch, that's all.

It is strong and durable, built for hard continuous service. It is accurately designed and finely con-structed of the best materials obtainable. We have yet to hear of a LECTROFLATER Pump that has

#### DECKER MFG. CO.

Distributors in Canada Northern Electric Company

Montreal Distributors in England R. A. Rathermel, 18 Poland St., Great Marlboro, London





WRITE FOR CATALOGUE

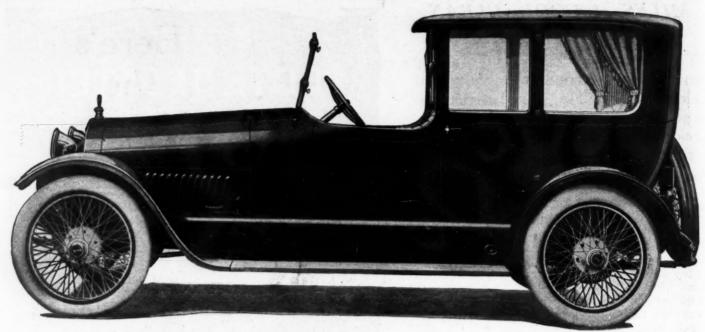
LECTROFLATER Electric Air Compressors are obtainable in a wide variety of sizes and combinations. There are vertical tank and pump combinations, De Lux curb outfits, little units and big units, units small enough to be carried about like a satchel, outfits that can be pushed about like a cart, tire shop outfits that can be mounted on brackets on the wall, out of the way; outfits mounted on light portable tubular frames like an adding machine, with tool tray included; units for indoor use and units for outdoor use, units of almost every kind at prices to fit almost any pocket book.

Complete descriptive literature on request. Prices range from \$50 up.



No. 2 Automatic Stationary Tank Outfit. I de a l equipment for in-stantaneous serv-

Model No. 2 Garage Pump Mounted on mov-able carriage.



### The New Haynes Town Car

LTRA-smart in its contours and equipment, this 1918 Haynes Town Car creates an epoch in fashionable offerings for the season.

Inlaid mahogany vanity and smoking cases, artistic corner and dome lights, silk robe rail, French pleated upholstery of delicate shadings with de luxe silk curtains to harmonize, plate glass windows which lower by aid of convenient lifts, Perfection heater, double windshield, speedometer and clock, are luxury touches of this elegant coach.

Five are seated within. The chauffeur's seat accommodates two additional.

Roominess predominates. Careful construction has mininized the weight. Springs are unusually broad, long and resilient.

The hood is high-arched and broad-chested. The body lines are straight. In deep carmine, royal green, Haynes blue or beige brown, the appearance of the car cuts a commanding figure.

Duplex headlights further enhance its style. Hartford shock absorbers add to the riding ease.

To be had in both "Light Six" and "Light Twelve" models.

—The 1918 Haynes Line also embraces all season sedans, coupes, four-passenger roadsters, five and seven-passenger open cars.

We have a splendid proposition for the dealer. Write or wire.

THE HAYNES AUTOMOBILE COMPANY 2S. Main St., Kokomo, Indiana, U. S. A.

25th Successful Year of

FAMERICA'S First Car"



The Master Primer is guaranteed to start a car in seven seconds at twenty-five degrees below zero. It has proved this in actual tests.

It is not a pump—needs no auxiliary tanks—no high test gasoline.

The Master Primer heats the gasoline—vaporizes it—mixes it with air and the manifold is instantly flooded with a rich, hot gas.

It will be standard equipment on all 1918 Franklin cars. It was adopted by the H. H. Franklin Mfg. Company only after the most exhaustive tests.

The Master Primer has a money back guarantee.

National Advertising is creating big demand.

It sells for \$12.50. You make a profit large enough to pay you to sell Master Primers.

Our special offer to dealers will interest you. This special offer means big profits to you in the next three months. Write today—now—before it slips your mind.

MASTER PRIMER COMPANY

1528 Fort Street W

Detroit, Michigan

### BIJUR ON THE JOB

# They Find the Truth About Non-Gran and Adopt It

THE Bijur Motor Lighting Company, manufacturers of the "Bijur System" for electric lighting and starting, are not content, nor have they ever been content, to stand still.

With "Bijur" it is always test—test. And when Bijur makes a test they do it right. They don't test one or two samples for one or two weeks. They test hundreds of samples and test for months.

Because of this "Forge ahead" policy, "Just good" was not good enough for the main bearings supporting the armature of the Bijur Generator. In their search for complete adequacy and uniformity, in these vital bearing parts, Non-Gran Bronze was naturally among the many metals tested. Hundreds of Non-Gran castings were put through the ropes.

Of course Non-Gran proved its superior adequacy and superior uniformity. When put to actual service test Non-Gran always proves its superiority.

If it's a "Bijur" you can bet on its bearings.

AMERICAN BRONZE CORPORATION
Berwyn
Pennsylvania



# Announcing The HILTON VALVELESS PUMP



The Hilton Pump is absolutely leak-proof. The expanding piston head supplemented by two auxiliary piston rings forms a seal that defies any leakage of oil or air.

The Hilton Pump has only sixteen parts. Other pumps have from thirty-five to fifty. Consequently the simplicity of this pump assures far less need of repairs and wear than other pumps can guarantee.

The Hilton Pump cannot be flooded with oil. It is lubricated by felt washers, which absorb only sufficient oil for perfect lubrication. Any surplus flows through to the ground, a feature impossible with splash systems.

The Hilton Pump does its work quicker than other pumps. Absolutely leak-proof, it accomplishes at less revolutions per minute the same results that other pumps obtain at greater speed. This, together with the long, thin fins which actually cool the pump, eliminates super-heating the hose and consequent deterioration.

The Hilton Pump outlives other pumps. An automatic check is attached to the end of the hose and screwed to the top of the pump. The dirt and grit which usually get into the valves of an ordinary tire pump and cause such trouble are thus carefully guarded against.

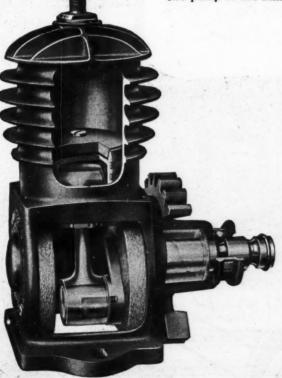
The Hilton Pump is the pump for your car. Made for all makes of cars, it is simple, easy to install, doubly efficient and overcomes every fault inherent in the ordinary tire pump. It offers you the best tire pump at the minimum price.

#### **DEALERS**

This is the biggest opportunity that has come your way for a long time.

The Hilton Pump will be sold in your territory.

Prove to us that you are the man to sell it and we'll make you a most liberal proposition.





Keene



N. H.



Tremendous popularity of Anchor Tops has this season overshadowed the success of separate winter-tops, in all automobile history.

Even with the tripled capacity of our larger, splendidly equipped factories, established over 30 years in high class coach-building, we have been taxed to the utmost in filling orders for

#### **OVERLAND**

#### **BUICK**

#### OAKLAND

Model 85, B-4 and 6 D-34, D-35, D-44 and Model 90 Country Club D-45, as well as the New E-44 and E-45

Models 32 and 34, Roadster and Touring Car

They may be seen at leading Overland, Buick and Oakland dealers' show rooms, as well as on the boulevards of practically all leading cities.

They are all beautifully finished - strong - light - durable. There is no over-hang-no squeak or rattle.

They fit perfectly, as if built on the car. Come, ready, complete and any one can put one on easily and quickly. Priced-

#### \$100 to \$175

and up
According to Car Model
F. O. B. Cincinnati

Shown or supplied by your dealer—or, write to us for full details.

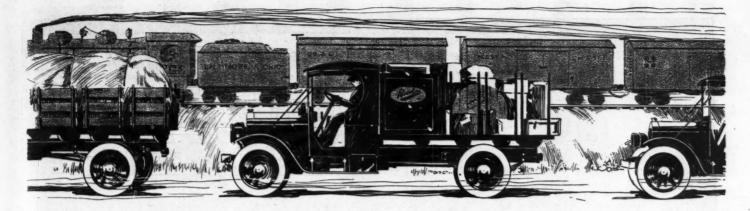
We accept \$25 deposit with order. Be sure to tell us your car name and model.

Write for descriptive literature.

#### THE ANCHOR TOP AND BODY CO.

Factories Established Over 30 Years 7329 South Street, Cincinnati, Ohio







#### 6 MODELS

3/4-ton, 1-ton 11/2-tons 2-tons 31/2-tons 5-tons All Worm Drive

#### **PRICES**

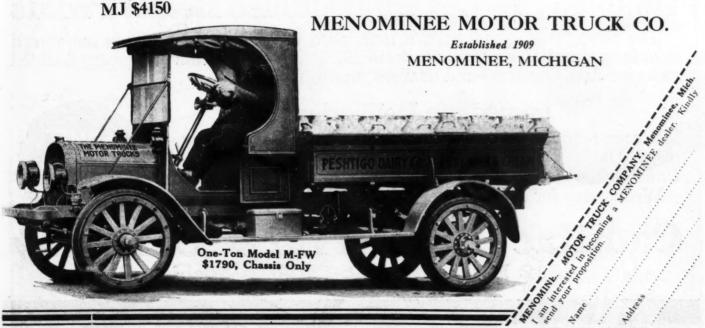
Chassis Only EW \$1425 FW \$1790 H \$2050 D \$2475 G \$3275

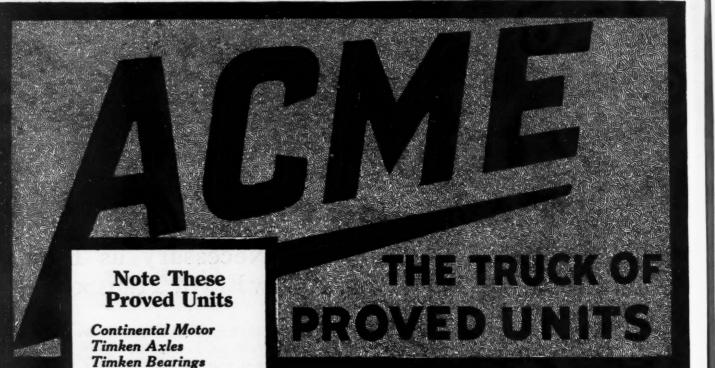
### Trucks as Necessary as Freight Trains in New Era of Transportation

Your Menominee motor truck takes up the work of transportation where the railroad leaves off. Your Menominee motor truck furnishes a spur from your loading platform to all railroads. Your Menominee motor truck will help relieve the freight situation through handling short hauls, releasing the freight cars formerly used for this work.

Your Menominee Truck now will quicker than ever pay for itself. Make certain against a possible truck shortage next year by ordering your Menominee today. There is a Menominee for every business. Write for full particulars.

MENOMINEE Dealers are in position to close with 80% of the truck prospects in their locality. Six different models—one for practically every business requirement—insures that. If interested in associating yourself with the finest aggregation of truck dealers in the country, use the coupon.





### 147 Big Advertisements

1918—a banner year for every Acme dealer! National advertising—147 smashing wallops in 26 leading magazines. Arrange now to reap the benefit of this great Acme truck advertising campaign.

### **Doubled Production; Doubled Dealer Profits**

The strength of Acme *proved units* as a convincing sales reason has forced *doubled* production of Acme trucks in 1918. Doubled production means doubled sales for Acme dealers—and *doubled profits*, too!

#### **Immediate Deliveries**

Long Radiator Detroit Springs

Ross Steering Gear Eisemann Magneto Rayfield Carburetor

Pierce Governor Cotta Transmission

Borg & Beck Clutch

and all other units of

known highest grade.

Stewart Vacuum System

We are ready now to close desirable territory with desirable men. Dealers can expect immediate deliveries. And "Proved Units" is the strongest selling point in the entire truck field. Write today for complete details.



### Cadillac Auto Truck Company

812 Mitchell Street, Cadillac, Michigan

# MICHELIN TIRES mean publicity-and plenty of it





# Number 4

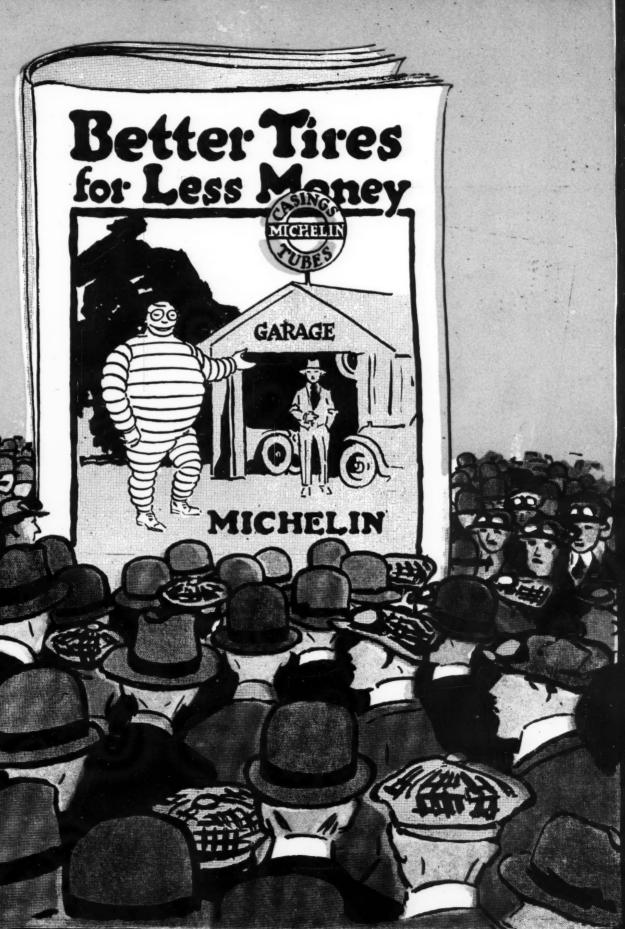
IN 1918 Michelin will tell every tire user in the country, time and time again, that the Michelin Dealer has a better tire for him at less money.

This welcome information will bring more customers than ever to Michelin Dealers everywhere.

Write now for details of one of the best propositions ever offered the tire trade.

Michelin Tire Company Milltown, N. J.

# TIRE TRADE





None Could be Higher in Quality-None More Moderate in Price.

THE SATURDAY

NEW THE RES

### Michelin Advertising

Is not mere publicity, but carries arealmessage about greater tire economy and satisfaction. It appears regularly, daily and weekly and monthly.

It gives actual facts that announce to the reader that Michelin's are best and cheapest in the end.

Thus it creates new customers who in turn create still others.

And remember: Once a Michelin User always a Michelin Dealers' Plan.



### 80,000 Square Feet of Floor Space

—new machinery of the most modern type; expert operatives and engineers to direct them; insure users of Liberty Axles a product that must make good.

Transportation facilities and material supply insure manufacturers of prompt and complete deliveries.

This axle does not divert in any way from present standardized practice in construction of worm drive rear axles.

WAGNER AXLE CO.
Anderson Indiana

HOME OF LIBERTY AXLE

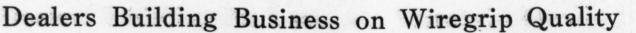
When Writing to Advertisers, Please Mention Motor Age

Steel prongs are of course practically positive in their action as a non-skid feature and outlast by thousands of miles the less positive skid retarding features of all other tires.

Four endless coils of spring steel laid parallel around the entire circumference of the tire are imbedded in the thick live rubber tread—would appear thus with the rubber cut away.

#### POSITIVE SAFETY

### NO BUMPS



ANCASTER

Dealers everywhere are building up substantial and profitable business on exclusive Wiregrip features.

There is no other tire like the Wiregrip—no other tire with the non-skid features, with the smooth but positive action of Wiregrip Tires.

They are appreciated everywhere because all of the vibration caused by knobs on other non-

skid tires is eliminated in the Wiregrip but more non-skid features remain. Thousands of steel points stick through the lively tread and hold the road in a grip of

steel. The care used in the manufacture of Wiregrips insures their superior wearing qualities, giving non-skid protection long after ordinary,

less effective non-skid features would be worn away. Wiregrips are made by hand. Only the best materials are used in their manufacture, giving greatly increased mileage. Wiregrip Tires are adjusted on a 6,000-mile basis.

The Tire with a Thousand Claws

Many go much farther-even 20,000 miles.

That is the reason why Wiregrips have been winning thousands of satisfied customers for

dealers. That is why dealers everywhere have been "cashing in" on Wiregrip success.

You can cash in on Wiregrip success. But write today. Several

spots of open territory are still available—and if you are the right man we have a proposition that will interest you. Don't Delay. Write or Wire Now.

The Lancaster Tire and Rubber Co., Lancaster, Ohio

THE TIRE WITH A





Now being used in the Manufacture of

Typewriters **Building Supplies** Automobiles **Motor Trucks Motor Accessories** Electrical Equipment Farm Implements Ranges and Stoves Steel Furniture Sporting Goods Phonographs Dental Supplies Railway Supplies Telephone Equipment Ornamental Iron Work Arms and Ammunition Etc., etc.

## The First Line of Defence for your Product "Rust Proof"!

Iron and steel products begin to rust immediately, regardless of whether they are being used or not. In fact, thousands of dollars' worth of expensive machinery is ruined every year by the action of rust before it has even been installed for use.

For instance, an automobile manufacturer made a shipment of cars to a dealer in the west. The dealer refused to accept them immediately and they were held in a railway warehouse for two months. When they were finally accepted they had to be refinished because of the action of rust.

Therefore, we say that the first thing for the manufacturer to do to make sure that his products give the fullest satisfaction to the user is to protect them against rust. This can be done by the Parker Process. Practically every kind of iron and steel construction work is being protected by this method.

From a farm tractor to a dental needle—every possible form of iron or steel product. Over five hundred manufacturers—most of whom were skeptical at the beginning—are now using the Parker Process.

We can easily convince you that it will benefit your products—that it will increase your sales—and enable you to give greater value for the price the consumer pays.

Our plant is always open to those who are interested in preventing rust. And we will also gladly perform any tests you may desire, either in your plant or in ours.

PARKER RUST-PROOF COMPANY OF AMERICA
DETROIT, MICHIGAN



The country is flooded with lenses of all kinds and descriptions. You know that most of them are merely made to sell. They simply diffuse the light so as to get by the law.

That is all right for the fellow in the other car. But how about you?

It simply means that the efficiency of the lights on your car has been lessened.

The motoring public has been waiting for a headlight front that performs two distinct functions:

1.- To prevent a glare from the lights on your own car.

2.-To get a strong driving light-so strong that no matter how intense the glare of the approaching car you will not be blinded, but can see the edge of the road clearly and pass safely without slowing down.



Front View of the

SHALER Roadlighter

It Shoots the Light Far Ahead

The prisms take the light which with an ordinary lens is spread and wasted along the sides of the road too far ahead of the car to be of any practical value and bend it, concentrating it as extra light on the road-bed.

as extra light on the road-bed.

Result: At a distance of say 200 feet ahead of the car the light on the road is approximately twice the intensity of that from a bulb of the same candle power projected through a clear glass headlight.

Pierces the Glare of Approaching Headlights

The light is so intense that it will pierce the glare from an approaching car and give a clear view of the side of the road when passing. This exclusive feature of the SHALER

Roadlighter is of prime importance.

The light which ordinarily shoots up into the air and is lost is bent down and toward both sides by the inner portion of the diagonal prisms so that the most concentrated part of the light is converted into an intense beam effect along the sides of the road, such as could only be obtained by using a spot-light on each side of the car. This highly intensified light counteracts the glare from an approaching headlight and enables one to keep a clear view of the edge of the road and pass in perfect safety without slowing down.

Rays Penetrate Fog and Dust

With any lens which permits the light to come above the level of the headlight, the rays strike the fog or dust particles and form a curtain of back-glare between the driver's eyes and the road. With the SHALER Roadlighter all the light is held down below the level of the headlight, doing away with the back-glare so that the driver is enabled to see ahead to the full length of the rays. Discoloring the glass and thereby dimming the light for driving under ordin-ary conditions is eliminated by the efficient design.

#### Tested—Proved—Guaranteed

The reports of our own experts—the official tests made in various cities and states the photometer and illuminometer tests made by Mr. F. A. Vaughn, Chairman of the Headlight: Committee of the Society of Illuminating Engineers, have demonstrated beyond the shadow of a doubt that the SHALER Roadlighter is infinitely superior in every way, and that it is the only lens that makes night driving as safe as by daylight. Every SHALER Roadlighter is sold under a positive guarantee of absolute satisfaction. absolute satisfaction.

> C. A. Shaler Co. Waupun,

#### Lights The Whole Road

You can now drive at night—with just as much safety—and just as fast as in daytime-without the delay and danger of slowing down and dimming your lights to allow another car to pass.

The new SHALER Roadlighter lights the entire road, from fence to fence, with a bright, white, evenly distributed light.

It has no glare-absolutely none-and the light beams are never more than 42 inches above the ground—at any distance from your car.

All of the light is evenly distributed on the road where you need it, giving brighter, safer night roads than you have ever seen before. It is approved by city, state and police officials everywhere and endorsed by leading accident insurance companies.

Unretouched Midnight Photograph

## DLIGHTER

#### It Illuminates the Ditches

The outer portion of diagonal prisms bends some of the light down and toward both sides, giving a wide-spreading fan of light that illuminates the ditches clear to the fences

#### It Is Easy to Keep Clean

The outer surface of the SHALER Roadlighter is perfectly smooth. There are no projections whatsoever on the outside to catch and hold snow, rain or dirt.

#### It Is Easy to Install

Since the outer surface of the SHALER Road-lighter is perfectly smooth, there are no projections against the rim of the headlight door to prevent proper seating. Therefore it is not necessary to know the diameter of the opening in the face of the lamp door.

#### Accurate Focusing Unnecessary

The prisms, which are at different angles with the smooth surface of the SHALER Roadlighter, deflect the rays so that there are no dark spots even if the bulb is not exactly focused.

#### It Is Legal Everywhere

The rays passing through the upper half of the lens are projected below the horizontal by the reflector itself and hence none of them are more than 42" above the surface of the road. The rays passing through the lower half of the lens are bent down below the horizontal by the diagonal prisms and hence are not projected more than 42" above the surface of the road—thus no light is wasted in glare and the SHALER Roadlighter complies with all no-glare ordinances.

Regular retail prices of the SHALER Roadlighter are \$2.75 per pair for Ford size and smaller; \$3.50 for larger sizes. Packed ten in a carton.

#### Limited Offer to Dealers Only

We want every automobile accessory dealer in the United States to try out a pair of SHALER Road-lighters on his own car—AT OUR EXPENSE.

Mail the coupon for full particulars regarding this big offer There is no obligation—don't put it off—clip and mail coupon now.

9200 Fourth St.

Wisconsin

#### Dealers' Offer Coupon

C. A. SHALER CO., 9200 Fourth St., Waupun, Wis.

Gentlemen: Send me full particulars about your offer to let dealers try out a pair of SHALER Roadlighters at your expense. This obligates me in no way.

Address

City and State

My Jobber's Name Is.

## CKEDIF

Mos. F. Hopkins fr. St Augustine, Fla.

"I chose the Briscoe because I honestly believe it presented the biggest value, dollar for dollar, that I could possibly offer.

"I had heard that the car was good, but when I learned first hand just how good the new Briscoe was, I was amazed. It puzzles me yet when I try to figure out how any factory can build so much value in a car for \$725.00.

"To prove to myself and my constituents that the economy claimed for this Half Million Dollar Motor was a reality, I attempted to drive a new stock Briscoe from Jackson, Michigan, to St. Augustine, Florida, a distance of thirteen hundred miles. I started, in an attempt to make this drive on fifty gallons of gas. The route chosen is what is known as the eastern route, Dixie Highway via Cincinnati, Lexington, Knoxville, Chattanooga, Atlanta, Waycross, and Jacksonville. When I arrived at St. Augustine, I found that actual distance was 1298 and seven-tenths miles, and the total amount of gasoline used was 4846 gallons an average of twenty-six and seven-tenths miles per gasoline used was 48½ gallons, an average of twenty-six and seven-tenths miles per gallon. Lubricating oil used was exceptionally small, only three quarts. I call that some economy. The entire trip was made in six days and a half, and from start to finish not a single bolt or nut needed tightening or adjusting. The hood was never raised except to put oil into the motor. All four tires had the original Michigan air in them at the end of the trip. I call that some car. Do you wonder that I can sell Briscoes easily? Honestly, we are making money faster than we ever hoped to do.'

(Signed) CHAS. F. HOPKINS, Jr., St. Augustine, Fla.

"Making Money Faster Than We Ever Hoped To"

That's proof of the profit possibilities the new Briscoe offers. If your territory is open you should get our liberal new offer. It means plenty of profits for the dealer who gets it, just as Mr. Hopkins reports. Address

BRISCOE MOTOR CORPORATION

Dept. 132 JACKSON, MICH.

Comes in th Body Style Most in Demand



## Compact Completeness

A distinctive Delco quality is compact completeness. Constant performance of every starting, lighting, and ignition function is the only Delco standard. Every need and every condition has been anticipated. Every detail has been provided that science and long experience can add to. This is the reason Delco indicates an automobile maker's intention to give his users the very best in automobile construction.

Workman installing Delco Motor Generator on Hudson Juper-Jix motor.

The Dayton Engineering Laboratories Company Dayton, Ohio U.S.A.

ten it ik yn is en enthers, from it minn Hefre it to

Delco

Starting, Lighting and Ignition Systems



THE "CHILLED RUBBER PROCESS" OF TREATING CRUDE RUBBER is a natural development, based on long experience in tire making. Its basic principles have been developed and its technique perfected, in the large, thoroughly equipped Laboratories which now form the central portion of the Gillette Factories at Eau Claire, Wisconsin.

THIS PROCESS TOUGHENS THE RUBBER, giving it a tenacity and wear-resistance peculiarly adapted to tire purposes. It has enabled the Gillette Company to produce a tire that, while in all other respects equal to other tires of the highest grade, is distinctly their superior in its ability to withstand wear and tear.

THE GILLETTE SAFETY TIRE is easily the King of Fabric Tires. THE GILLETTE CORD TIRE combines all the advantages of cord construction with the unusual qualities of the "Chilled Rubber Process." No finer tire is obtainable.

Salety

## Gillette

#### **Extraordinary Wearing Ability**

The remarkable performance of Gillette Safety Tires, made possible by the "Chilled Rubber Process," of manufacture, has won for these tires the firm faith of motorists who have had the personal experience of their wonderful resistance to wear and tear.

There are thousands of Gillette Safety Tires now in service, and the distance records made by them are the strongest evidence of their remarkable character.

Here is a tire that will always outlast the mileage warrant; a tire whose mileage guarantee is delivered on the roads, in actual service; a light, smooth-running, perfectly balanced tire, with an extraordinary quality of rubber that assures it much longer life.

#### The Gillette Dealer Has These Big Advantages

He has a tire that is absolutely unrivaled. You can prove that statement under your own tests.

He has behind him a specially trained and thoroughly modern selling force, assuring him a wide distribution throughout his own territory.

He holds a definite place in the Gillette organization, receiving the same quality of service and attention as though his establishment were a branch office of the company.

His business is his own, no matter how large and prosperous it becomes he will still hold the Gillette agency. We help him build it, and hold it, and it is not our policy to establish branches to compete with him.

We should be glad to send full particulars to good, responsible dealers who desire to hook up with the biggest tire proposition for 1918.

#### THE GILLETTE RUBBER COMPANY

Chicago Office 122 Michigan Ave. General Sales Office 1824 Broadway, New York Factories
Eau Claire, Wis.





## Higher Values!!

Are built into every Columbia Axle.

- —in engineering—materials workmanship.
- -which represent added worth throughout.

—made possible at no increased cost by scientific low cost production methods.

In the successful accomplishment of these "higher values" at nominal prices, we are entitled to the earnest consideration of every producer of motor cars.

We stand ready to prove these facts for your benefit. Write us today.

The Columbia Axle Company

Cleveland, Ohio

# Stops Ford chatter grab and slip

That noisy chat-t-er-ing when you work the Ford brake is more than a nuisance. It means hard, slippery brake linings—waste motion—lost "pull"—car ruining vibration.

#### ADVANCE

#### CORKINSERT

#### TRANSMISSION LININGS FOR FORDS

stop the chattering because they stop the grab and slip. The buttons of cork never become smooth or hard. Both corks and fabric wear very slowly. One set outwears three sets of ordinary linings.

Cork Insert Transmission Linings make the Ford brake brake—make the car "pull" better and haul heavier truck loads—get instant action in response to a mere touch to the pedals—give "pep" in the get-away, put positive action in the brake.

Cork Insert Products will be
Exhibited at the New York
and Chicago
Shows

Dealers
Order Cork Inserts

from your jobber. Cork Inserts are one of the biggest successes of the year in the trade. Every Ford has to have transmission linings and fan belts. Cork Inserts do the work better — last longer — save money. They are strongly advertised. They certainly do move and keep profits rolling in.

Advance Automobile Accessories Corp.

Stops Fan Belt Slipping

The ordinary Ford fan belt soon gets "slippery as an eel." That means as high as 25% to 50% lost power. The fan naturally doesn't fan as it should — the motor overheats because it isn't properly fanned — and there's trouble to pay. **Most** motor trouble, in fact, results from overheating.

Cork Insert Fan Belt stops slipping throughout its long service. The buttons of cork hold their ability to grip—not affected by water, oil, grease or dirt. Better service, longer wear, greater economy.

PRICES
Cork Insert Transmission
Linings, \$3 per set of 3
Cork Insert Fan Belts, \$1
for 1917 Fords
\$55 for preceding models

Dept. L12-1		
56 E.	Randolph	Fo
-	treet	Ad
CL	icago	Dep
	ncago III	Encl

Ford Owner's Coupon Check and Mail Today  Advance Automobile Accessories Corp.  Dept. L12-1 56 East Randolph'St., Chicago	Advance Automobile Accessories Corp.
Enclosed find \$	Send one dozen sets of Advance Cork Insert Transmission Linings for Fords.  Send one dozen Advance Cork Insert Fan Belts, 1917 Ford.  Send one dozen Advance Cork Insert Fan Belts, 1916 or earlier model Ford. (Regular dealer discounts to apply.)
Name	Name
CityState	CityState
Dealer's Name	Johnson's Name



## PROPOSITION - TERRITORY

The Amazon proposition to Jobbers and Dealers carries Exclusive Selling Rights.

This makes it worth while to push the Tire and build up a permanent trade. It means no competition—which in turn means no price cutting; and this means your legitimate margin of profit on every sale.

It gives your business a distinctiveness, and distinc-

tion—to be the Amazon Dealer. Your competitor across the street cannot handle them—only you can cash in on the demand for Amazon Supertires.

Would you like to know more about territory, and the other details of our proposition?

(Fourth Ad of a Series)

THE AMAZON
RVBBER COMPANY

AKRON, OHIO

# CARBURETOR

The air valve is to a carburetor what the heart is to the human body—a mighty important part. In either case if the action is "off," trouble is bound to result.

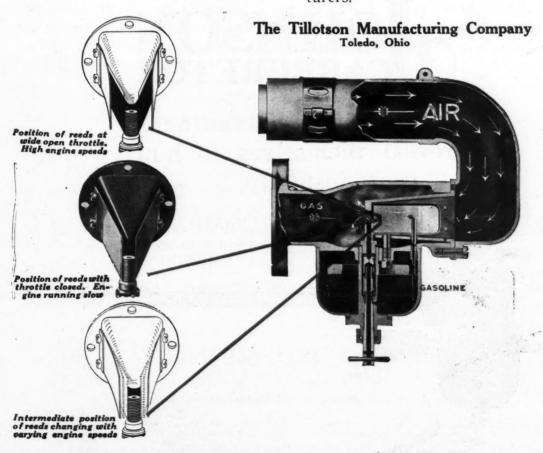
In the Tillotson Carburetor the action of the air valve is absolutely automatic.

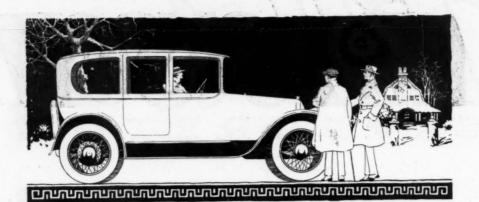
Two flexible steel reeds open and close at the fuel supply nozzle, maintaining at all engine speeds the high-

est possible vacuum and greatest air velocity at this point.

The maximum partial vacuum that the pistons create with the engine running at high speed can only open these reeds a small portion of their elastic limit and their life is practically endless.

The air valve action is but one of the dependable features in the Tillotson design that appeals to automobile engineers and manufacturers.





Take the man who knows motor cars. Explain to him the design, construction, operation of the

## OHNSON CARBURETOR

Its manifold advantages reveal themselves to him instantly







#### means tire thrift

These are the days when you want your tire money to secure the utmost in value for you; careful purchasing is in line with the national movement toward intensive thrift.

The unusual economy advantages of Marathon Hand-made Tires are bringing many car owners to the realization that a well-made, hand-built tire is, in the end, the cheapest tire to buy.

Of course, you will pay more for Marathon tires on the day of your purchase; it is only natural that there should be a premium placed upon the hand-made article in these days when machine-made products have temporarily standardized lower prices.

It costs more to make Marathon Hand-Made Tires; just as it costs more to make a finely tailored suit than a ready-made suit of clothes.

But Marathon Tires are for men who believe in paying the premium that skillful hand-work deserves; for men who are farsighted enough to know that a tire thus made will bring better service in the end and is, therefore, cheaper in the end. If you have never tried a real hand-made tire, this is a good time to begin. You'll find the saving over the period of a year to be a very substantial one. Put Marathons on your car.

#### THE MARATHON TIRE & RUBBER CO.

CUYAHOGA FALLS, OHIO

Canadian Factory, St. Catherines, Ontario

700 Beacon Street.....Boston 549 W. 52nd Street.....New York 1458 S. Michigan Avenue...Chicago WAREHOUSES: 3434 Locust Street......St. Louis 200 S. Highland Avenue.Pittsburgh 10213 Euclid Avenue.....Cleveland 1809 Grand Avenue.....Kansas City 55 Second Street.....San Francisco Chandler Hudson Hupmobile

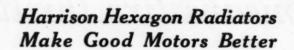
Mitchell Oldsmobile

Peerless Columbia

also

Gramm

and Federal Trucks



There can be only one reason why so many cars of widespread, marked success give Harrison Radiators the strong endorsement of year after year continued use. That is quality and performance.

The Harrison Hexagon stands out as the symbol of highest efficiency in cooling systems. Harrison cooling system embodies greater fuel economy due to higher cooling efficiency with lightness of weight through the peculiar arrangement and construction of cells, original with Harrison—distinctly Harrison. Harrison is the genuine, original hexagon radiator.

A good motor is a better motor when equipped with a Harrison Hexagon Radiator.

uip-

Harrison

Radiator

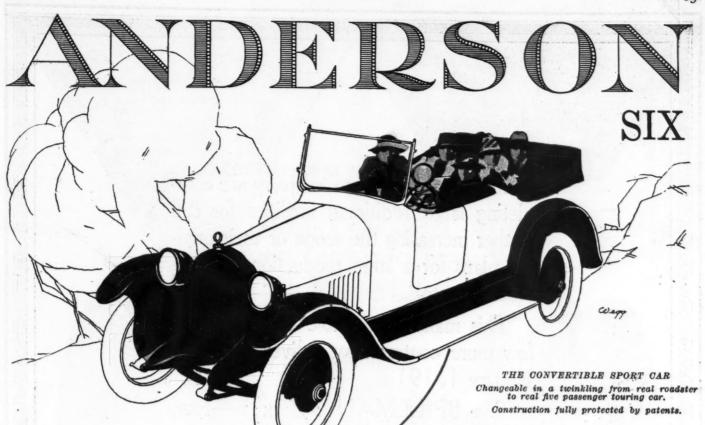
Lockport

New York

Corporation

## HARRISON

Original Hexagon Cellular Radiators



#### TOURING CAR and ROADSTER

Both in One Model

The finish of all Anderson Cars is hand applied and hand rubbed, insuring the same deep and lasting lustre that is given the finest types of custom built cars. The upholstery is form fitting of real curled hair, over a bed of fine coiled springs, tailored in real leather French pleated.



THE owner of a Convertible Sport Car is, in fact, the owner of TWO cars.

He is the owner of a powerful looking, low hung Roadster just big enough for two.

He is likewise the owner of a roomy Touring Car that will comfortably accommodate five without the slightest crowding or cramping.

The change from one model to the other can be made in a twinkling, whenever you wish, and without the slightest trouble.

Automobile men pronounce it the greatest achievement of the year in body designing. Its exceptional utility and smart distinctiveness mark a new epoch in fine coach work designing.

The smart and original lines, the finely tailored leather upholstery, the

rakish top, the lustrous finish, the pleasing rich color combinations, all stamp it a custom built car, and it is.

All Anderson bodies are designed and built in our own big body plant where we have specialized in the production of fine coach work for 28 years.

As for performance, it will do all the things the best stock "SLX" will do. The mechanical units are all of completely established excellence, everywhere known as the finest by motor wise men.

The motor is a Continental "SIX," a giant for power in a chassis as light as that of the ANDERSON. It will average 16 miles to a gallon of gasoline. It will travel from 2 to 55 miles an hour on high. It will ride easy at almost any speed. The wheel base is 120 inches, the rear springs are semi-elliptic and underslung and 56 inches long.

As regular equipment there is a BOYCE Motometer, a KELLOGG Engine Driven Tire Pump, a KLAXON Motor Driven warning signal, a HAWTHORNE "Old Sol" Spot Light, a UTILITY Combination heater and foot rest, Oil Gauge and Gasoline Gauge on the dash, One Man Semi-Victoria Top, quick inside attachable storm curtains.

Descriptive literature will be mailed on request.

#### ANDERSON MOTOR COMPANY, Rock Hill, S. C.

Foreign department, 8-10 Bridge St., New York City

#### PRICES INCLUDE NEW WAR TAX

Herschell-Spillman Company are completing large additional facilities for still further increasing the scope of their original plans for a large production of automobile motors.

This makes it possible to negotiate a few more contracts for deliveries beyond January 1, 1918.

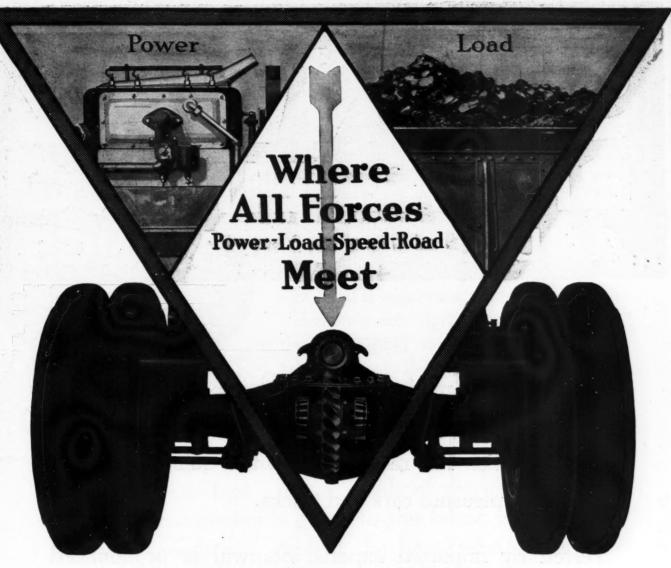
The SPILLMAN 3½ x 5—four, and 3½ x 5—eight cylinder engines are pre-eminent as power plants for automobiles.

The reasons may be set forth convincingly to those who are interested in producing passenger cars of high merit.

Upon request we will submit evidence which will impress the mind of the manufacturer of the propriety of installing Herschell-Spillman motors in his automobiles.

HERSCHELL-SPILLMAN CO.

North Tonawanda, N. Y.



Where engine power forces gears to turn under the increased load at starting, climbing hills or struggling through muddy ruts and deep sand.

Where the bumps in the road jam the axles up and the load hammers them down.

Where careless driving at high speed, shakes, rattles and jars the whole mechanism.

The final responsibility for commercial haulage rests on the part where all the forces of wear and tear combine in greatest measure—the rear axle.

Your only real assurance of axle quality is the actual record of long years of performance—such as Timken-Detroit Worm-Drive Axles have had since the day the first one went into service.



THE TIMKEN-DETROIT AXLE COMPANY
Detroit, Michigan



## TIMKEN-DETROIT WORM-DRIVE AXLES

For Efficient COMMERCIAL Haulage

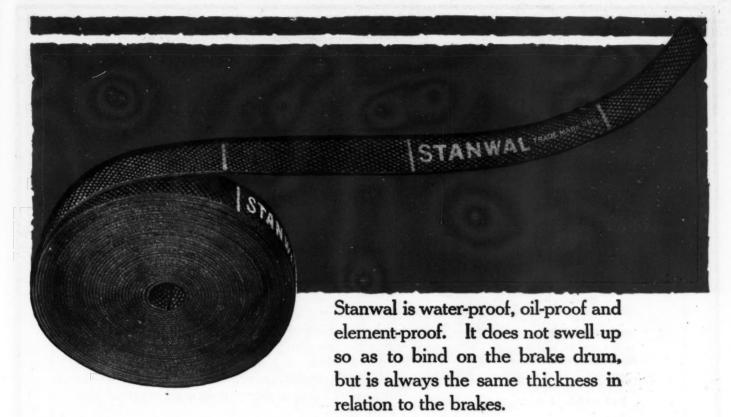
When Writing to Advertisers, Please Mention Motor Age

## STANMAL BRAKE LINING AND CLUTCH FACINGS

STANWAL marks a distinct advancement in manufacture. It is an engineering achievement—an invention which has revolutionized the quality of brake linings for pleasure cars and trucks.

Tested by impartial experts, Stanwal is pronounced perfect in performance. It withstands the frictional heat generated in the brake drums under any conditions of service.

Stanwal will not absorb moisture. It is unaffected by oil and water. It is noiseless under severe pressure. It averages a plus 25 per cent wearing quality.



CTANWAL improves with use. This is made possible by the exclusive, scientific treatment which is given to every foot. As a result of this treatment a high frictional quality is given to the fabric, and as the frictional pressure is applied the heat-resisting quality increases.

Write for our descriptive booklet, "Safety at a Saving"

#### STANDARD WOVEN FABRIC CO. WALPOLE, MASS.

New York Branch and Export Office, 1834 Broadway Chicago Branch Office, 1430 Michigan Avenue Detroit Branch Office, 306 New Telegraph Building Philadelphia Branch Office, 406 Colonial Trust Co. Building

#### OTHER STANWAL PRODUCTS

Multibestos Brake Lining and Clutch Facing Stanwal Friction and Insulating Tapes Splicing Compounds Cable and Specification Tapes

Tire Tapes

Moulded Rubber Goods Stanwal Matting Stanwal Rubber Heels Stanwal Fiber Soles

#### acuum Carburetor



Newburgh

For other cars the prices are \$8 and \$10, depending on the fittings required. Its service is supreme on all makes and models of cars.

See Us at the Shows-

New York Space D-8, Fourth Floor

Chicago Booth 5, Armory Balcony

#### Starts Easily and Surely in Zero Weather

Our exclusive choke makes starting in Winter as easy as in Summer when your motor's equipped with a Sunderman Carburetor.

It simply shuts off the air while you are cranking. Thus the cylinders draw in pure gasolinefinely vaporized because of the Sunderman mixing principle—and your motor fires on the first turn nine times out of ten.

Enthusiastic buyers are writing us daily—"the quickest-starting carburetor in cold weather that ever saw.

With a Sunderman there's no need, therefore, of the provoking crank, crank, crank, a wheeze, a "spit" and a dying motor every time you want to start.

No need, either, for letting your motor waste gas while the car is standing because of hard starting.

#### The SUNDERMAN Starts in a Flash—Because IT'S RIGHT

It's RIGHT because it is scientifically designed to give perfectly efficient carburetion at all times - in frigid February as well as sultry Summer.

It's designed for POWER, and gives as a by-product an economy of 30 to 50 per cent in gasoline on any

It's flexible—even an amateur driver can run it up and down a range of speeds that is almost uncanny. Therefore, it has a quick pick-up—galloping from low to medium to high speed as quickly almost as you can give it the gas.

Because of its design, its mixing principle, its quick starting, its power, pick-up and economy

#### The Sunderman Carburetor Is Unparalleled in Winter Use.

Car Owners: Give your motors a Christmas present—a new lease of life—a Sunderman.

Dealers: Our proposition is a great feeder

for your cash register. Write for it NOW.

#### Sunderman Corporation

11 Chambers Street

Newburgh, N. Y.

Western Office: 403 Kresge Building, Detroit

## The Most Remarkable Automobile Top Material —Yet Produced



DrideK with its leather finish, will not scratch or chafe—you can put up your top and feel sure that there are no marks on it; nothing to show where a big wrinkle has been strapped down.

DrideK with its leather finish, stands the hard wear that makes satisfied customers; and greatly increases the value of any automobile.

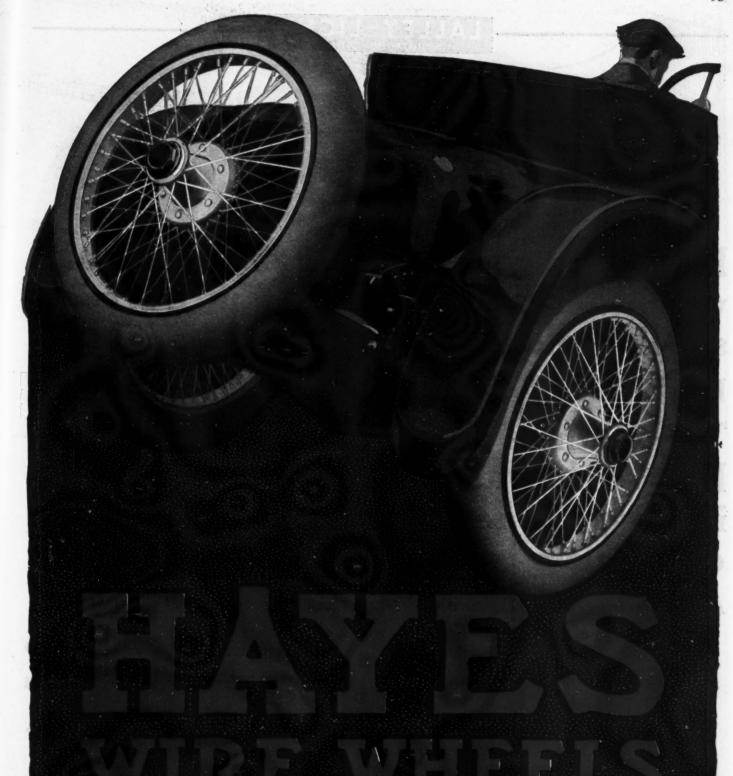
DrideK is one of the specialties in the big line of rubberized fabrics that has helped in popularizing our big line.

Send for samples and prices. They will meet with your approval, and fit well into your specifications.

L. J. MUTTY COMPANY BOSTON, MASS.



When Writing to Advertisers, Please Mention Motor Age



Dealers who want to sell a wire wheel that spells profitable business will do well to investigate the "Hayes" Wire Wheel. "Hand-book on Wire Wheels" gladly sent on request.

NEW YORK, Chadwick-Delamater Co.,
159 W. 24th Street.
CHICAGO, C. R. Kyte, Inc.,
2023 Michigan Avenue.
BOSTON, Bolce-Perrine Co.

East 24th Street & Chester Avenue.

EMINNEAPOLIS, Perfection Equipment Co.

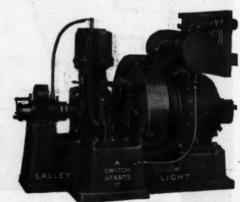
CASTLE & KYTE 872 WOODWARD AVENUE Detroit, Michigan

#### LALLEY - LIGHT

Every property owner in every community which has no central-station electrical supply—and every farmer—is a legitimate prospect for Lalley-Light.

The vastness and fertility of the Lalley-Light field—its wonderful sales possibilities everywhere—are attracting motor car dealers by the score.

Lalley Electro-Lighting Corporation, 1821 Mt. Elliott Avenue, Detroit, Michigan



Plant is 27 inches long, 14 inches wide, 21 inches high

## LALLEY-LIGHT

THE BALL-BEARING ELECTRIC LIGHT PLANT



## Sign of a Satisfied Dealer

WHERE you see a Firestone Sign you find a contented dealer. His customers are happy. His business is booming. He is receiving thorough-going selling co-operation. Firestone Tires satisfy dealers because they satisfy customers. Cord or Fabric, they meet the most severe conditions successfully. The dealer knows this; no one better. He knows, too, that sales helps are at his call at any time. Whatever his local conditions, there's a Firestone selling plan to meet them.

Attractive advertisements, booklets, folders and magazine "Milestones," carrying the dealer's own advertising; these selling aids establish a business firmly.

DEALERS: If you do not know the Firestone proposition, write for it. Good for your customers. Good for you.

FIRESTONE TIRE AND RUBBER COMPANY Akron, Ohio

Branches and Dealers Everywhere



#### Haywood's



### Tire Repair and Vulcanizing Service

In these days of high tire prices, the tire repair business is getting bigger and better than ever, as motorists learn the method of true tire economy. Why not cash in on this opportunity? Put in a Haywood Tire Repair Plant: Link up with a nationally advertised tire repair service. Six years of Haywood's advertising has standardized the Haywood method.

#### The Sign of the Man and Machine

—is the connecting link between the tire repair man and the automobile owner. It chains the established trade of hundreds of customers to your business. It connects your shop with a national tire repair service—a standardized service—a service that motorists know absolutely to be economical, practical and efficient.

#### The Haywood System

—is scientific—a true system of conservation of tires—a system that saves motorists thousands of dollars on tire bills. It means repairs that are lasting—vulcanizing that holds—repairs that are solid as the original tire itself, insurance to motorists of no regrets on the road.

#### Haywood's Tire Repairing and Vulcanizing Plants

The Haywood Plants are complete, all in one unit—are easily operated—no experience necessary. Here is your opportunity to make big money—to add hundreds of dollars in profits a year to your business. Occupies only a small part of your shop—can stand right out in the open where your customers can see it—a constant reminder to keep their three repaired. Your shop equipped with a Haywood Plant is the motorist's logical haven for the repairing. It completes your service—a service that customers like—a service that brings and holds business at big net profits.

#### Write for New Catalog

Use a letter, or post card, or simply send the coupon below. This brings the big book of facts—tells all about tires and how to repair them—shows outfits in use—gives proof of successes—shows how we co-operate with plenty of advertising and plenty of help—how you link up with a national service. Book gives complete details. Write today. Don't delay.

#### THE HAYWOOD TIRE & EQUIPMENT CO.

720 N. Capitol Avenue

Indianapolis, Ind.

Haywood Tire & Equipment 720 N. Capitol Ave., India	Co., anapolis, Ind.
Gentlemen: Please send service of tire repairing and Haywood Tire Repair Plans.	me full particulars of your national complete catalog and information of
Name	

## RUSCO

## The Better Brake Lining

For years Rusco brake lining has been standard equipment on a number of makes of automobiles. It has retained this distinction because the manufacturers of these cars, by means of their own tests, have proved beyond question that Rusco is the better brake lining.

The extra long fibred asbestos insures remarkably long wear; heavy looms, especially constructed in our own shops, guarantee a close, uniform weave; and our special impregnating compound makes Rusco waterproof, heat-proof, and oil proof. This is why

#### RUSCO LINING BRAKE

can always be depended upon to give long, efficient and satisfactory service.

IF YOUR GARAGEMAN HASN'T RUSCO BRAKE LINING, WRITE US DIRECT

Other Rusco products include

Cone Clutch Facing Clutch Discs

### THE RUSSELL MANUFACTURING CO.

MIDDLETOWN, CONN.

New York City

Detroit, Mich.



These 35 mills, covering 450,000 sq. ft., stand behind Rusco Products



When Writing to Adpertisers, Please Mention Motor Age

#### MORE EFFICIENCY

in

#### Protexall One Piece Suits

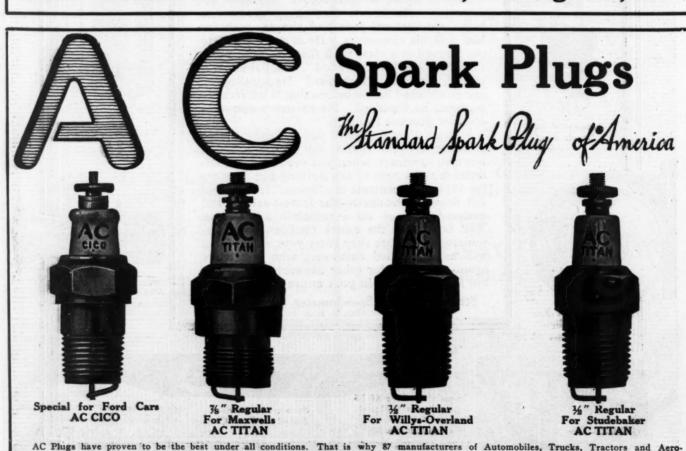


For you there is now a new belted Protexall One Piece Suit—one that looks better, wears better and fits better. It is made possible by an inside belt which is so constructed that it cannot catch on a protruding object. The special spring back designing of our experts has made absolute comfort possible for the wearer of this suit, as there cannot possibly be any strain at any point.

The new Protexall is made in the famous cotton o. d. (khaki), genuine government dyed, and a heavy blue denim.

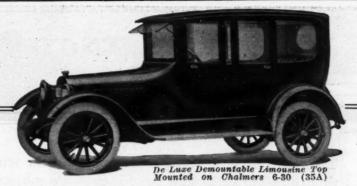
Demand this PROTEXALL One Piece Suit—it makes personal effort greater and more safe.

THE PROTEXALL COMPANY, Abingdon, Ill.



AC Plugs have proven to be the best under all conditions. That is why 87 manufacturers of Automobiles, Trucks, Tractors and Aeroplanes use them for regular equipment. The leading race drivers are using them. Your motor will not give its best performance unless equipped with AC. You will come to them in time. Why not buy a set NOW and note the improvement?

CHAMPION IGNITION CO., Flint, Mich., U. S. A.



#### De Luxe Demountable Limousine Tops

Make Your Chalmers Car Like "Indoors" All Winter

Owners of Chalmers cars, who equip with DE LUXE Demountable Limousine Tops, extend the comfort of "in-doors" to their motoring in winter time. And in addition to making them comfortable and warm, DE LUXE Demountable Limousine Tops add additional beauty and refinement, and do away with "putting the car up" for the winter.

#### Also for Haynes—Premier—Roamer—Liberty and Franklin Cars—1916-17 and Current Models

DE LUXE Tops are manufactured in a strictly high class manner. They are not to be compared with any of the cheap tops now on the market.

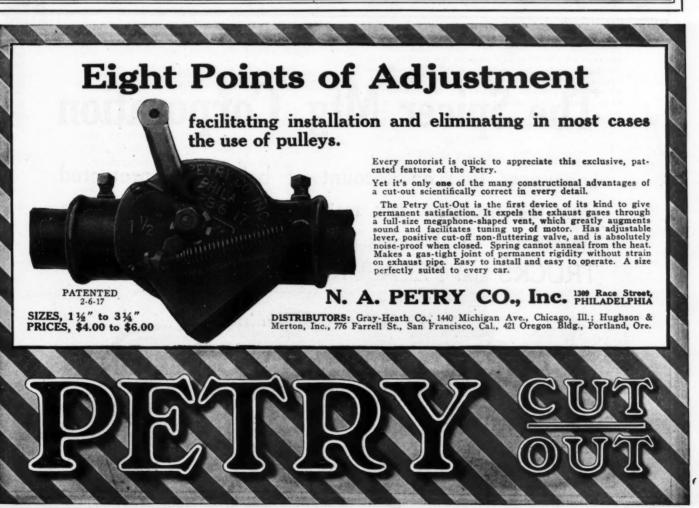
The side panels are all removable; all glass is of polished plate, ground edges; the windshield is built in, of the latest auxiliary rain vision ventilating type.

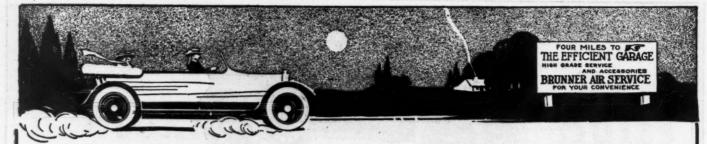
LIMOUSINE TOP COMPANY

The interior is neatly trimmed. The exterior is handsomely finished with sixteen coat work. Dealers know DE LUXE equipment because of the pressing demand. Write for free illustrated circular

with details and prices.

1902 Factory St., Kalamazoo, Mich.







The motorist who drives his car during the winter months knows that the severe jolts and jars his tires are subjected to on the frozen ruts and ridges of the roads during the winter necessitate even more careful tire inflation than during the summer months, and he favors Brunner Air Service because he knows it is a dependable and efficient service—

#### Investigate the BRUNNER Air Compressor

If you do not find the Brunner Line in your jobber's catalogue we will be glad to send you the name of the Brunner Jobber covering your territory and one of our complete catalogues and Garageman's Handbooks on Compressed Air.



#### BRUNNER MANUFACTURING COMPANY

Main Office and Plant UTICA, N. Y. Cincinnati Branch
CINCINNATI, OHIO



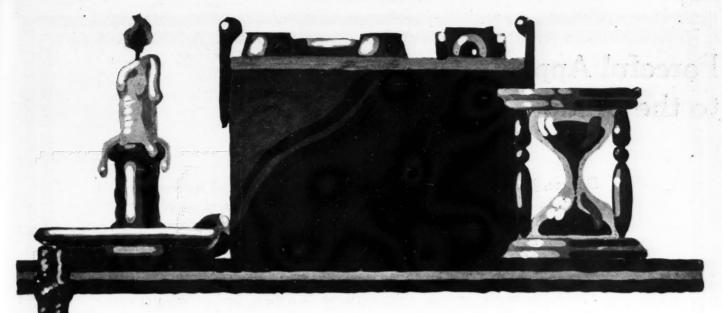
## The Spicer Mfg. Corporation

announces that on account of being well protected with the necessary raw materials, it is prepared at the present time to fill orders promptly for Universal Joints for TRUCKS and PLEASURE CARS.

We Invite Your Inquiries

### SPICER MFG. CORPORATION SOUTH PLAINFIELD, N. J.

L. D. BOLTON 2215 Dime Savings Bank Bldg., Detroit A. H. COATES 41 Spear St., San Francisco, Cal.



#### The Everlasting Battery

Never before in the history of the automobile industry has there been offered a battery with such an inherent capacity for long satisfactory service.

PERMALIFE BATTERIES, in every process of manufacture, from the forming of the specially designed lead grids to the last thorough test in the Permalife Laboratory, bespeak permanency.

THE LIFE OF A BATTERY is in the plates and here lies the fundamental reason for Permalife superiority.

PERMALITE PLATES are packed—not pasted—with an active material of such density as to make them well-nigh indestructible. And yet, this active material presents a surface to the electrolyte which insures quick and free chemical

action — and a resultant rapid current output.

The harmful sulphation, which is the prevailing disease among other makes, is completely prevented in Permalife Batteries. Barring abusive treatment Permalife Batteries are positively non-sulphating.

DEALERS—The Permalife merchandising plan presents a unique opportunity to capture and keep the bulk of your local battery business. It is of vital importance to you because it insures a permanent battery service to your patrons and gives you their permanent patronage.

Let us show you the profit getting possibilities of Permalife.

#### Write for this AT ONCE

Permalife Storage Battery Co., Inc., POUGHKEEPSIE, N. Y.



When Writing to Advertisers, Please Mention Motor Age

## Forceful Appeal to the Trade

Dealers, jobbers and garage owners are the natural and successful channels of distribution for cars, trucks, accessories and supplies. To reach this combined class with strong merchandising appeal, and at a minimum of expense, is made possible via the advertising pages of MOTOR WORLD.

The forthcoming special Before Show Numbers are of greater importance this year than ever before. They can be used to splendid advantage by manufacturers who hope to have their merchandise message read and carefully considered by the big wholesale and retail distributors throughout the industry.

MOTOR WORLD is published weekly. Edited exclusively for dealers, jobbers and garage owners—those who sell and maintain all products of the automotive industry. As an advertising medium it presents an unique value, assuring favorable introduction and contact with thousands of dealers and maintenance men. Its audience is 100% interested. It talks the language that is understood and appreciated by its readers, who have come to depend upon MOTOR WORLD for authoritative information, education and guidance.

The special Before Show Numbers are:

Dec. 26—Before New York Show Number Jan. 16—Before Chicago Show Number

In order that there may be no eleventh hour rush please send copy and cuts to arrive at New York office at least one week ahead of publication dates. This cooperation will promote mutual advantage. Address all communications to: Motor World, 239 West 39th Street, New York City.

Take Advantage of this Opportunity

# J.o.w.a

## COMMERCIAL CHASSIS Universal Units

Are for Other Cars as Well as Fords

#### Prices For Ford Cars

1-ton Model E, I16" Wheel
Base, 32x3½" Tires.....\$390
1-ton Model E, 144" Wheel
Base, 32x3½" Tires..... 415
2-ton Model O, 116" Wheel
Base, 32x3½" Tires..... 490
2-ton Model O, 144" Wheel
Base, 32x3½" Tires..... 515

The Universal Unit fitting all makes of cars, except cars with transmission on the rear axle.

34x3½" regular tires and 34x3½" dual tires can be furnished at small extra cost.

The IOWA Chassis offers dealers an almost unlimited field for sales, because, unlike other units, both IOWA Models will fit all makes of cars except cars with transmission on the rear axle.

Don't tie yourself down to a single model unit that is only for Fords. The IOWA Chassis—1 and 2-ton models—gives you a chance to make real profits.

We can fill orders promptly.

#### Note the Opening of Our New Omaha Branch

To increase the efficiency of our selling organization, for the benefit of dealers and owners alike, we are opening a

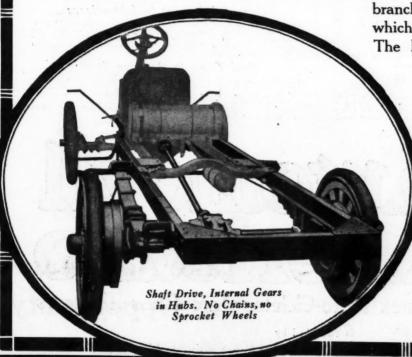
> branch office in Omaha, Nebraska, which will operate under the name of The Iowa Motor Truck Company.

> > Mr. H. H. Cannon, 245-7-9 Omaha National Bank, will act as our branch manager.

The IOWA Commercial Chassis—either 1 or 2-ton model—is the best converter buy on the market.

Dealers and Users, write for complete details. Remember, it is for other cars as well as Fords.

Iowa Motor Truck Company OTTUMWA IOWA





### Hundreds of Thousands of New Buyers—

Whatever effect the war may have had on the domestic market for automobile products, it is evident that it has opened a splendid new trade channel in Latin America. This trade has been shut off from its accustomed source of supply—Europe—and the United States now remains its sole reliance.

#### A MARKET OF UNRIVALLED PROMISE

Think of five thousand dealers, jobbers and garagemen—supplying hundreds of thousands of users—suddenly left without a place to buy. Such was the status of Latin America when the war stopped all shipments from Europe. Now they have turned to YOU with an earnest appeal to supply their wants. They need every description of automobile products; and, owing to the time consumed in transportation, they carry large stocks.

#### The Demand Is Growing

Two circumstances—hot climate and poor horses—have combined to create a great popular demand for automobiles, trucks and tractors in

South and Central America, Cuba and the West Indies. Thousands of plantations, hundreds of prosperous commercial centers, and countless thousands of individual pleasure seekers, drawn to the open by perpetual warm weather and unparalleled scent beauties, have given the automobile a tremendous vogue in this great outdoorland.

#### This Trade Is Permanent

This opportunity, suddenly thrust on the American automotive industry, should be seized and capitalized. It is not transient, but permanent: for your Latin American connections, once established, can never be wrested from you. You will find your trade enthusiastic and loyal.

#### How to Get and Hold This Business

You must tell your story to the Latin American trade through its own trade medium—EL AUTOMOVIL AMERICANO. Faced with the necessity of switching their purchasing to the United States, these buyers had to have a competent and trustworthy source of information concerning our industrial activities. EL AUTOMOVIL AMERICANO is their sole official organ—the only automobile publication going from the United States to Latin America. It is printed in their own language—Spanish—is properly illustrated with photographs and drawings, gives all facts of interest about ears, trucks, tractors, parts, accessories, roads, tours, etc., and contains special articles on the proper care and maintenance of automobiles, and practical hints on shop practice.

#### Big Buying Season Now

EL AUTOMOVIL AMERICANO is published quarterly. The forth-coming issue—January—reaches the trade when its heaviest buying is being done. January is midsummer in Latin America. Your advertising in this issue will find these buyers in their most responsive mood,

feeling the weight of a demand which they are hard pressed to meet. It is a splendid time to establish connections looking to the future, even if you are not prepared to handle foreign business at the present time.

#### Personal Service to Advertisers

Our Service Department, trained in the ways of Latin American buyers, will prepare and translate your advertisements without charge. Art work and engravings are furnished at actual cost. The service also includes the translation of inquiries and correspondence resulting from your advertising.

#### Still Time to Reserve Space

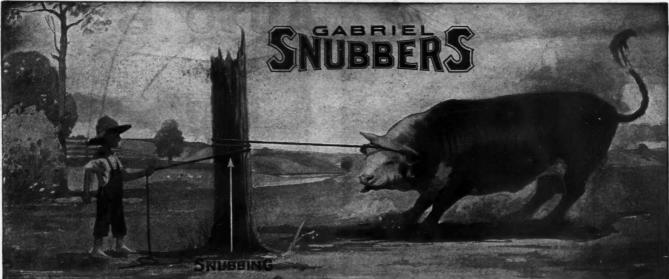
Prompt action will insure your representation in this issue. Orders for space must be in our hands by December 24th at the latest. If we are to prepare copy for your advertisements, the order should reach us before December 18th. Write or wire at once for rate card and particulars. You cannot afford to miss this big January trade.

## El Amonóvil E Americano

Automóviles · Camiones · Moto-Cicletas · Aeroplanos · Tractores

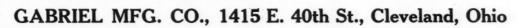
Is Published by

The CLASS JOURNAL COMPANY, 239 West 39th St., New York



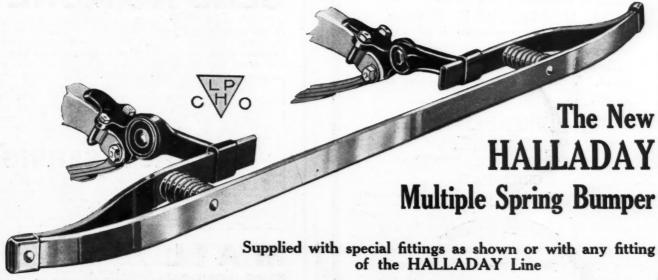
#### It's the Coil That Does the Work

When the Bull pulls, the coils tighten and hold him. When your car starts to rebound, the coils of the Snubber tighten and prevent abrupt or excessive upswing of the springs. That makes the car ride easier and prevents spring breakage.





#### The High Water Mark in Bumper Efficiency



The shock resisting qualities are derived from a combination of three steel spring bars and two heavy spiral spring buffers. The spring ends are joined by a flexible connection which eliminates breakage at this point.

Experienced dealers and car owners will quickly appreciate the enormous strength and efficiency of this bumper and the wise ones will get busy.

DISTRIBUTED THROUGH REGULAR CHANNELS

#### L. P. HALLADAY COMPANY, Streator, Illinois

Distributors: Asch & Co., 16-24 W. 61st Street, New York City; E. L. Thompson Co., 817 Boylston Street, Boston, Mass.; Gray-Heath Co., 1440 Michigan Avenue, Chicago, Illinois; Sanford Brothers, Chattanooga, Tenn., Southern Distributors; Hughson & Merton, Inc., San Francisco, Los Angeles, Portland and Seattle, Pacific Coast Distributors.



#### to start a cold motor.

The LUNKENHEIMER PRIMER will inject the necessary charge of atomized gasoline directly into the intake ports, from where it enters the cylinders, giving a power impulse on the first turn.

No need to waste the starter battery spinning the motor, trying to vaporize the gasoline at the carburetor.

The saving in battery energy alone will in a short time more than offset the cost of this efficient device. Besides, by its use, you have the additional advantages of convenience and safety - convenient, because it is mounted in the cowl within easy reach of the driver and is always ready for use, and safe, because the gasoline is not exposed to the atmosphere.

The LUNKENHEIMER PRIMER is easily attached to any make of car and all necessary connections are furnished.

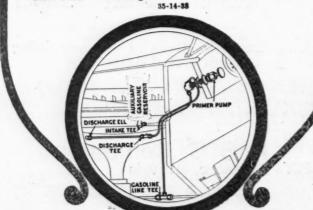
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### HOT-PIN MANIFOLD

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slides and swings the doors inside the garage away from snow and ice in the driveway outside.

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When in danger—you'll be glad you did. For S-M-C on Brake lining means Safety Made Certain; always—all ways

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is complete with three proper lengths for Ford Transmission and all rivets required. At best dealers, or by mail postpaid **S** 

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Pat. June 5th, 1917

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Minimize carbon deposits, because carbon cannot bake on Aluminite Pistons. The added power, speed and smoothness that come with Aluminite Pistons will put your car in the 1918 class. Positively guaranteed. Send us the name, year and model of your car for specifications.

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1/3 weight of steel

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WRITE TODAY FOR PRICES

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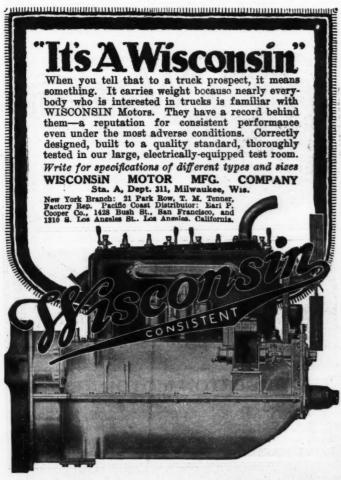
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Pittsburgh Representative:
JAMES T. SHELTON.................24th & Sidney Sts









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Retainers for Cup and Cone, Thrust and Magneto Type Ball Bearings

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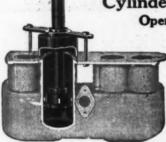
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The Prest-O-Lite Co., Inc.
The World's Largest Makers of Dissolved Acetylene
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Rebores cylinder from start to finish without slightest taper, and perfectly round. Automatic and quick in action. Takes as much as 1-16" oversize in one operation, and completed job will be a smooth finish and true to 1-1,000 of an inch. Range of expansion 2½" to 51-16", any type motor.

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**30**0 MODEL 354 AMMETER

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First Aid for All Motor Troubles

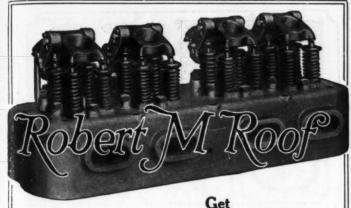
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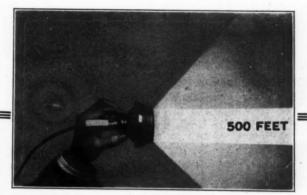
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# **Demountable Rims**

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Controlling Perlman Demountable Rim Patents





Saves Its Price in the First Accident It Averts

Tells the man behind what you are going to do before he bumps into you. Simple and cheap to operate. Takes the place of your regular tail light. Write for details.

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The Pullmore Front Drive

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"Dependable Delivery"

1 1/4 ton Chassis \$1245 2 1/4 ton Chassis \$1775 1 1/4 ton Complete with body and cab \$1285 2 1/4 ton Complete with body and cab \$1840 All F. O. B. Allentown

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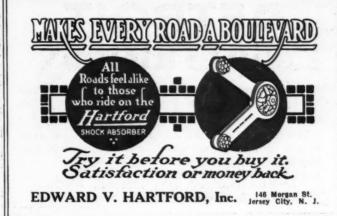
Guarantee Liquid Measure Company Farmers' Bank Building, PITTSBURGH, PA.

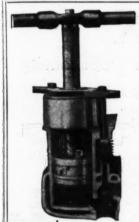












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is adjustable and will rebore practically all makes of

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It is simple, speedy and accurate and can be used by anyone familiar with tools.

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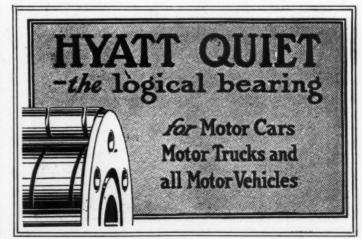
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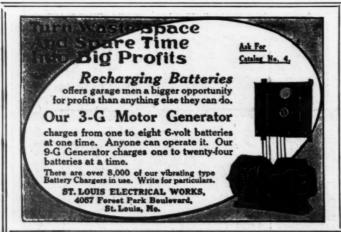
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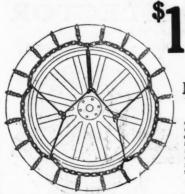


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for a pair of these Chain Tighteners keeps your chain from running too loose, and insures against losing them.

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catches chain at five points, gives even tension all around, allows chain to creep, but not to slip, around wheel and can be used on any tire. A simple, light, neat durable device which is easily carried and easily applied and means safety and real economy.

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\$1.90 per set of two. Lift the car out instead of digging it in deeper. Thousands in use. Most effective device of its kind on the market.

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Act with steady lift which does not strip the differential gears.
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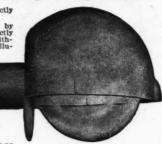
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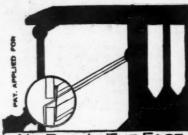
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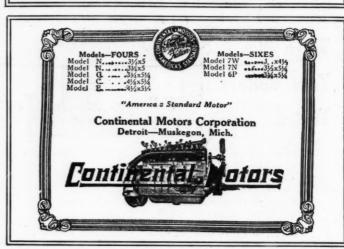


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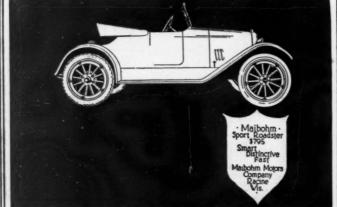
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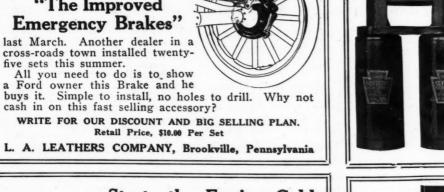
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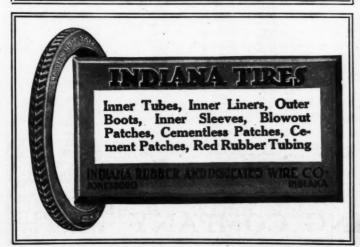
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touring
Reo, 1913
Cadillac 30, 1910
E. M. F. 30
Chalmers 1911, Model
M
Everett 30, 1912

Hudson 33, 1911 and
1912

Maxwell LR, 2 cyl.
Overland 79, 1914
Overland 59, 1912
R. C. H., 1912
Studebaker Six, 1915
Velie, Model 5-R, 1914
White 30, 1910 Everett 30, 1912

Oakland 40-42 Overland 69-79 Overland 52-53 Overland 54-71 Overland 81 Pierce-Arrow Pope Hartford Packard 30 Patterson Regal 40—R. C. H. Reo 1910-1911 Reo 1912-1913 Speedwell Stoddard Dayton Studebaker 25-35 Velie 40 Warren Detroit Winton 1909-1914 Brush Brush Gleason Limited

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Everett
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Flanders, 3 speed Ford T. Garford & Haynes Hudson 20-33 Hupp 20-32 Jackson Jackson
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If you could but walk through our plant and see our stock, you would be convinced of our ability to save you a great deal of money and also of the fact that a great majority of our stock is as good as new. But you are not here. Therefore, in order to convince you, we offer the following proposition. If, upon examination, the parts do not fulfill your expectations, you may return same, for we give a "Money Back Guar-antee." You are the judge. Let us convince you. Place order today while our stock is complete. No delay, no wrong parts, no dissatisfaction, but intelligent service rendered with great good will.

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We have a method of racking parts that is perfect.
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We have received a shipment of ten tons of Gears for all makes of cars. Send us your old Gears and let us match them. UNHEARD-OF BARGAINS.

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COMPLETE ENGINES—Mitchell 6, 1912, \$100; Flanders 20, \$50; Cadillac 1909, \$65; R. C. H., \$50; Overland 42, \$80; Mitchell T. 1911, \$75; Cadillac 1912, \$90; E.M.F. 30, \$50; Kline 6 cyl., \$125; Hudson 33, \$125; Jeffery, \$100; Imperial, \$125; Premier, 6 cyl., \$125.

Will sell most any part from these engines. We have a large stock of engines and will trade engines with you.

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Our catalog is ready for your inspection. Write today for same. Not only will this list the stock on hand, but it will aid you in ordering any parts that you may need, for it explains all in detail, and if you will follow instructions, it will do away with all delay. When you want the right goods at the right prices wire, phone, write.

THE AUTO PARTS COMPANY (Inc.), St. Louis, Missouri, Davenport, Iowa

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SAVE 50% TO 75%

Stop buying junk that never does or never can give satisfaction. We protect you. We guarantee our parts to be right and what's more, we further guarantee that our prices will be as low as any other house in America.

We can make this guarantee because we are the largest Auto Parts House in America. We believe in small profits and big sales. Some day you will buy from us. Why not NOW?

We have in stock parts for all models and makes of Automobiles. Our stock consists of Motors, Transmissions, Axles, Crank Shafts, Crank Cases, Etc. Below is but a partial list of cars for which we can supply all parts:

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rank Cases, Etc. Bel Glide-Warren-Detroit Locomobile-Knox Interstate—Jackson Abbott Detroit Courier-Glide Buick 10-17-19-30 Moon 30-40-45 & C Maxwell, all models to 13 Packard, 1905 to 1912 Pierce-Arrow, 1907 to 1912 Hudson 20, 33, 37, 6-54 Ohio-Regal, 20-30 Bergdoll-Staver Allen, 1915 and 1916

King, 1911, 1912, 1913
Paige 25-36—Empire 25
Standard 6—Metz
Stevens-Duryea
Midland-Wayne-Welch
Selden
Stearns, 30 to 60
Kissel 4-6
Matheson 4-6
Amplex, all models
Pope Toledo—Winton 6
Oakland 30 & 40
Pope Hartford
Reo, 1908 to 1914

of cars for which we Atlas-Speedwell Mitchell, 1908 to 1914 Thomas, all models Great Western—R. C. H. Oldsmobile Special Limited-Autocrat-Defender—42 and 43 American Underslung 30 to 50 Scout Case 40 Haynes—Carter Car Overland 38-40-41-42-56-59 60-69-71-45-46-51-54-55 Pratt-Firestone-Columbia

can supply all parts:
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Apperson-Marion
International-Staver
Lozier—4 & 6
Winton 6
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Marathon
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Rambler
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Cleveland, Ohio

AMERICAN-UNDERSLUNG
ADAMS TRUCKS M-A-R-I
NYBERG RIDER-LEWI M-A-R-I-O-N RIDER-LEWIS WAVERLEY-ELECTRIC PARTS AND REPAIRS—ALL MODELS
V. A. LONGAKER CO.
Catalog Free Indianapolis, Ind.

When Writing to Advertisers, Please Mention Motor Age

Rebuilding and Repairing.

Rebuilding and Repairing.

Rebuilding and Repairing. **PISTONS** 

own shops.

Special Discounts to Jobbers and Wholesalers

Special Discounts to Jobbers and Wholesalers TRUMP MULTIPLE PISTON RINGS are all sold under a Positive Guarantee, the user being the sole judge. They save reboring cylinders; they add 25% more vim to your engine; save on your oil and gasoline, and you will have no dirty, sloppy engine and spark plugs. Easy to put on your pistons; have no pins to break and damage your cylinders. Ford sizes, \$1.00 each.

CYLINDER-REGRINDING

RINGS

TRUMP MFG. CO. St. Crown Point, Ind.

# Cylinder Grinding

on special highest grade cylinder grinding machinery. No makeshift tools. Work handled by men with automobile factory experience. Large assortment of patterns for iron pistons. Complete stock of piston rings. Prompt service. Highest grade work only, fully guaranteed.

### Aluminite Pistons and Aluminite Connecting Rods

Aluminite pistons will put six cylinder smoothness into a four cylinder motor; improve a six or eight, give more power and quicker get-away. For prices, state make, model and year. Piston pins, aluminite connecting rods and racing motors.

For Tractors, these pistons will greatly increase the efficiency of the motor and save the bearings.

### Motors

Complete stock-new and used -for all makes of cars. Every motor in perfect conditionno junk. We also build and overhaul motors, both automobile and aeronautical. Many a good car proves inefficient, due to motor trouble. We specialize in motor work, often changing a four-cylinder to a six, eight or twelve. Don't discard a car otherwise satisfactory, because of motor trouble. Tell us your difficulty and let us solve the problem quickly, efficiently and at a reasonable expense.

Green Engineering Co. Dayton, Ohio

# Cylinders Reground

Over 500 Piston Patterns Always in Stock.

Our Expert Mechanics and our Highest Grade Equipment are your guarantee for highest class workmanship.

Our Special Light Alloy Pistons will give you More Power-More Speed; we also do Gear Cutting of Spur and

> Auto Engine Works St. Paul, Minn.

### Cylinders Reground

Highest grade of work, including new pistons and rings for \$5 to \$10 per cylinder. Aluminum alloy pistons furnished at \$1 to \$3 per cylinder extra, light semi-steel pistons at slight advance above cast iron.

-\$10 SPECIAL FORD JOB-Ford cylinders reground, new rings,

bushings and wrist pins for \$10. Manufacturers of Pistons and Rings

CROWN MACHINE SHOP **CROWN POINT** INDIANA

We Have Specialized in

CYLINDER GRINDING FITTING PISTONS AND RINGS

continuously since 1902

"There Must Be a Reason"

GEO. H. BLETTNER CO.

1401-05 W. Jackson Blvd. Chicago, Ill.

Bevel Gears.

# Largest in Middle West

**PISTONS** 

Catharine St.

Our complete records give Permanence and Continued Service

**PINS** 

BUTLER MFG. CO. Established 1897

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### PONDELICK BROS.

Largest Mfrs. of Duplicate Auto Parts in U. S. Leavitt St. & Jackson Blvd. Chicago, Ill. WE GRIND CYLINDERS FOR \$1.50 AND UP

WE GRIND CYLINDERS FOR \$1.50 AND UP according to condition of cylinder.

Cylinders reground and fitted with special heat-treated Pistons, Pondelick's Self-Adjusting Anti-Leak Rings, new wrist-pin, hardened and ground, bushings made of genuine bronze, including fitting and assembling of connecting rod to piston for \$15.00 per Cylinder.

Do Not Compare Our Welding and workmanship with that of others, as we have no competitors in our class of work. If you have any broken parts that others cannot weld, or repair, send them to us. We not only do ordinary repair work, but we increase the durability of many parts, where the manufacturers fall.

We Do All Kinds of Gear Cutting. FREE-Large Illustrated Booklet.

Visit our plant-and be convinced, or ask any where about our work.

### CYLINDERS REBORED

New Pistons and Rings installed. Our prices right. Send work; efficient and prompt service.

**GABEL BROTHERS** 

35 3rd Street

Fond du Lac, Wis.

# Cylinder Grinding

on automatic machinery by skilled mechanics at prices that will interest you. Gears, Axles, Valves and parts of all kinds made of highgrade alloy steel. Send us your worn or broken parts and we will replace them.

-Oxy-Acetylene Welding-

### **GEAR RINGS**

for Self-Starters, Gears of every description cut or made to specifications.

THE ADAPT MACHINERY CO. 1624 S. Wabash Ave. CHICAGO, ILL.

### PHONE CAL. 6593 TRINDL MACHINE WORKS Cylinder Grinding

PISTONS - RINGS - WRIST PINS 61 East 24th Street, CHICAGO, ILL.

### CYLINDER GRINDING

with light semi-steel or aluminum alloy

pistons Get Our Special Prices

SALTER MOTOR MFG. CO.
1518 Oakland Ave. Kansas City, Mo.

# Cylinders Refinished

Pistons, Rings, Pins, Axles, Gear Cutting. All Auto Machine Work. Send old parts.

**RABUS & TOELLER** 

Cedar Rapids

### CYLINDERS REGROUND

New Pistons, Rings and Wrist Pins fitted. Patterns for nearly all makes of cars in stock, which assures prompt service. Prices right—work guaranteed. We Solicit a Trial.

Erie Auto Engineering Co., Inc. 902-04-06 Cherry Street Toledo, Ohio

When Writing to Advertisers, Please Mention Motor Age

Rebuilding and Repairing. Tires.

Rebuilding and Repairing. Tires.

SCORED CYLINDERS

OUR PROCESS HAS BEEN USED AND ACCEPTED BY THE LEADING MANUFACTURERS

Repaired 'by the Originators of the "NICKEL-STEEL ALLOY" ELECTRICAL & CHEMICAL PROCESS (Patent Pending). Improvement over all old methods. Tested by Armour Institute and withstood several hundred degrees more heat than your motor will ever attain.

Work Guaranteed for the Life of the Motor Save 75% GET FREE ILLUSTRATED 24-HOUR SERVICE WARPED AND OVERSIZE CYLINDERS REGROUND AND FITTED WITH NEW PISTONS AND RINGS. WELDING OF ALL METALS. E. BORMAN CORPORATION, 1612 Michigan Avenue, Chicago, Ill. Phone Calumet 6207.

World's Largest Cylinder Repairing Co. Over Sixteen Thousand Satisfied Customers

Nearest Plant Your

Fused Electrically by the "Lawrence Patent Process"

Repaired with Our Silver-Nickel Alloy

No Warping or enlarging of bore. Same piston and rings used. Work guaranteed for life of engine. 24-hour service. Tested and approved by all manufacturers.

L. LAWRENCE & COMPANY, CHICAGO, 1522 Michigan Avenue NEW YORK CITY, 546 W. 45th Street NEWARK, N. J., 292 Halsey Street

CLEVELAND, 1810 Prospect CINCINNATI, 410 Richmond

### GROUND SUNDERLAN] CYLINDERS

ARE PERFECT Magnalite or Cast Iron Pistons—SPECIAL—Ford Job \$10.00—Reground—New Pistons SUNDERLAND MACHINERY COMPANY 1006-8-10 Douglas, Omaha, Neb.

YLINDER Reground—We Weld Anything
Fitted with cast iron or light pistons;
leak-proof or plain piston rings.
Best equipped shop in the country.
Quick Service—Reasonable Prices—Gear Cutting
SIOUX CITY WELDING & MACHINERY CO.
Dept. MA. Sioux City, lowa

### CYLINDERS REBORED

By expert machinists on specially designed machines, insuring absolute accuracy and the highest attainable quality of finish. Special heat-treated extra light new pistons, and re-turned rings fitted without extra charge. Wrist pins to order. Reboring, autos, \$4.50 to \$9.50 per cylinder; special price on Fords.

PARK MACHINE CO.

22 W. 3rd St.

St. Paul, Minn.

### CYLINDERS REGROUND

New pistons, rings, wrist pins; automobile parts repaired and duplicated. Crankshafts Reground. We also weld crankshafts.

STERLING ENGINE COMPANY Chicago, Ill. 333 South Clinton Street

### Scored Cylinders Repaired

We use the same pistons. General machine work for foreign and American cars. All parts duplicated. Welding of all metals. Manufacturer of Catelain Hose Coupling, Ever-Ready Starters, U. S. Shock Eliminators. Quick service, satisfaction guaranteed.

ANDRE CATELAIN

1446-8 Indiana Avenue

Chicago, Ill.

### CYLINDERS REGROUND

AND FITTED WITH ALUMINUM ALLOY
PISTONS
SCORED CYLINDERS REPAIRED.
PROMPT SERVICE
WRITE FOR CATALOGUE AND PRICES

E. N. EGGE MACHINE CO.

roadway PLAINVIEW, TEXAS

### CYLINDERS REGROUND

\$5 to \$11 per cylinder, including pistons and rings. Alloy Pistons, from \$1.50 to \$3.50 per cylinder, extra. Ford cylinders reground and fitted with pistons, rings, wrist-pins and bushings for \$11 per set of four.

Racing Motors a Specialty

D. R. NOONAN

### CYLINDERS REGROUND

including new pistons and rings. Any size— & to \$7 per cylinder. All our work guaranteed. Quick shipments. Let us prove our ability on your next job.

82 Lark Street

716 St. Charles St.

NEUPERT MFG. COMPANY
Street Buffalo, N. Y.

### CYLINDER GRINDING

WITH HIGHEST GRADE EQUIPMENT
either cast iron pistons and rings or our special light
alloy pistons and rings furnished. Best workmanship.
State make of car in writing.
CRANKSHAFTS REGROUND on special crankshaft
grinders—not filed and lapped, but REGROUND

S T A F F O R D M O T O R C O. 2201-2209 Campbell Ave. KANSAS CITY, MO.

ASK US HOW MANY PROSPECTIVE customers you can reach every week by using this space. We'll tell you how economically, too.

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MOTOR AGE,

CHICAGO

The World's Greatest Cut-Rate Tire House

The World's Greatest Cut-Rate Tire House of standard make firsts, seconds and factory blemished tires. Every tire is guaranteed to give Service and Satisfaction.

THES TUBES THES TUBES TUBES TUBES TUBES TUBES Size Plain Non-Skid Red Gray Size Plain Non-Skid Red Gray 28:73. \$8.00 \$8.65 \$2.10 \$1.90 \$68:4 \$17.50 \$18.75 \$3.60 \$3.50 \$3.50 \$3.53 \$8.50 \$9.25 \$2.50 \$2.10 \$1.90 \$68:4 \$17.50 \$18.75 \$3.60 \$3.50 \$3.60 \$3.54 \$17.50 \$18.75 \$3.60 \$3.50 \$3.53 \$1.23 \$2.50 \$2.50 \$2.50 \$32.44 \$18.15 \$19.10 \$7.0 \$3.60 \$3.52 \$4.55

FIDELITY TIRE AND RUBBER COMPANY Phone Main 440

NON-SKID SECONDS—Best Value Ever Offered for the Money
Tire Size Tire Size Tire Size 32x4.....\$12.00 37x4½.....\$18.50 30x3.....\$ 6.75 36x4.....\$14.00 30x3½..... 8.50 33x4..... 12.50 34x4½..... 17.00 35x5..... 19.00 32x3½..... 10.00 34x4..... 13.00 35x4½..... 17.50 36x5..... 19.50 35x4..... 13.50 36x4½..... 18.00 37x5..... 20.00

HIGH GRADE TIRES

All goods shipped promptly, \$1 deposit required with each tire order. Balance C. O. D., subject to examination. Special proposition to dealers.

### ROYAL TIRE & SUPPLY CO.

1463 Michigan Avenue, CHICAGO

Phone Calumet 2553

New Orleans, La.

Guaranteed, Fresh

### Factory Seconds

Lowest prices ever quoted anywhere on Standard Makes, seconds and factory blemished tires. Tread I & SS Tread I & SS n-Skid n-Skid 28x3. \$6.90 \$7.23 30x3. 6.70 7.05 30x3/4 8.73 9.13 31x3/2 9.18 9.65 32x3/2 10.20 10.70 34x3/2 11.90 12.48 31x4 13.38 14.00 32x4 13.63 14.30 33x4 14.27 14.93 34x4 14.58 15.33 These times area 11. 35x4. \$16.65 \$17.50 36x4. 17.10 17.95 33x44½ 19.02 19.98 34x4½ 20.55 21.55 35x4½ 20.85 21.55 37x4½ 23.90 25.10 35x5. 23.45 24.63 36x5. 26.55 27.85 37x5. 24.83 26.08

These tires are all standard makes and were originally guaranteed for 5,000 miles. Order today. Send 10% with order. Goods shipped today. Send 10% with order. Goods shipped C. O. D. Goods shipped C. O. D. Deposit required on all orders. Mention style of rim.

Public Service Tire & Rubber Co. of N. Y., Inc. New York City

OUBLE TREAD TIREC

GUARANTEED ON 3,500-MILE BASIS
Special Cut Prices on All Sizes
From \$4.45 to \$11.30
Get Our Price List and Tire Rebuilding
Proposition
Guaranty Rubber Tire Co. of America

1308 Michigan Avenue Chicago, Ill.

# NEW-IDEA TIRES

Real Tires That Give

# **REAL MILEAGE**

GET THESE PRICES

Send us two worn out tires

### AT OUR EXPENSE

no matter how bad and for the following prices we will send you, C. O. D. anywhere, a real non-skid tire, NOT sewed on stuff, but real

### NEW LIVE RUBBER

If your old tire is worn too much, we junk it and furnish one instead.

30x3	\$5.50	34x4 ·	\$9.90
30x31/2			12.00
31x4	7.15	36x4	11.25
32x31/2	7.70	36x4½	12.65
32x4	7.95	35x5	13.00
33x4	8.75	37x5	13.75

Let us RE-TREAD your tread-worn tires and be convinced. Some of our customers have gotten 5,000 miles additional out of their old tires.

Dealers, write for proposition

The New-Idea Tire Company 1343 W. Girard Ave., Philadelphia, Pa.

# Real Tire Bargains

Our tires are new, fresh stock which have only slight surface blemishes, which do not affect their wearing qualities. We can not furnish a mileage guarantee at prices quoted, but every purchaser must be a satisfied customer.

purchaser	must	De a	satisfied cus	omer.
Size		Plain	Non-Skid	Tubes
30x3		.\$ 6.75	\$ 8.25	\$2.20
30x3½			10.75	2.50
32x3½			11.75	2.80
34x3½			13.50	3.00
31x4			15.25	3.25
32x4			15.75	3.35
33x4		. 14.75	16.00	3.40
34x4		. 15.50	16.50	3.60
35x4		. 15.75	17.00	3.75
36x4		. 16.50	18.00	4.00
34x41/2		. 21.00	24.00	4.50
35x41/2		. 21.50	25.00	4.50
36x41/2		. 21.75	24.00	4.75
35x5			25.00	5.00
36x5			26.50	5.50
37x5			26.75	5.75

TUBES GUARANTEED
All goods shipped promptly. \$1 deposit required with each tire order. Balance C. O. D. subject to examination.

VICTORIA TIRE & RUBBER CO.

Dept. D.

1331 Michigan Avenue Chicago, Illinois

# Hester Tire & Rubber Co.

# "40% Saving in Price and Wear"

THIS IS JUST ONE OF THE MANY LETTERS COMING IN DAILY. WRITE FOR OTHERS

### RIESTENBERG BROS.

PRACTICAL PLUMBING, GAS FITTING & SEWER TAPPING
Corner Harrison Avenue and Barnard Street

Cincinnati, Ohio, April 20th, 1916. The Hester Tire & Rubber Co.,

Cleveland, Ohio.

Gentlemen: -We have been a stockholder in your company for about a year and find it to be a profitable and good

investment to us.

We have three automobiles running daily with Hester
Tires, and we find them a saving in price and wear about forty

percent.

We also find that they are better tires than the ordinary make; they hold up free from sand bags, cuts, etc. They wear down to the last thread; it is a pleasure to run on Hester Tires, no worry about blowouts. Some of our tires run over 5,000 miles and are still running.

We only hope you continue making that grade of tire,

We only hope you continue making that grade of tire it helps us. No changing of tires every month when we are using Hester tires.

Thanking you for past prompt deliveries,
Yours,

RIESTENBERG BROS.

# LOOK AT THESE PRICES FOR A 5000-MILE GUARANTEED TIRE

### **NET PRICES**

		E	ffective Oct	ber 20, 1917			
Size	Plain	Non-Skid	Tubes	Size	Plain	Non-Skid	Tubes
30x3	\$10.70	\$11.85	\$2.55	34x4			\$4.55
30x3½			2.95	$34x4\frac{1}{2}$			5.70
32x3½	17.15	18.60	3.10	35x5			6.75
33x4	22.15	24.55	4.45	37x5	39.10	43.35	7.00
Oak	es Ciasa au	Danmant	Delana	Subject to Change	an Wilshaus !	Master	

### QUALITY TIRES ONLY

Remember that these are high quality tires! We have abundant evidence from actual users, showing their splendid performance in actual service. And the 5000-mile guarantee holds good for the life of the tire, no matter how many miles or how many days it has to run. Only perfect tires in every respect are delivered, and full adjustments are made on purchase price.

FILL OUT AND MAIL COUPON On receipt of the attached coupon, you full particulars of just how these tires can be obtained. Send the coupon today and save money on the very next tire you buy.

# Hester Tire & Rubber Co. Cleveland Ohio Ohio

FILL OUT AND MAIL AT ONCE

HESTER TIRE & RUBBER CO., 5200 Euclid Ave., Cleveland, Ohio.

Dear Sirs:—Please send me complete information relative to your method of selling tires, and tell me how I can save money on the next tire I buy.

Name .....

Address

### SPECIAL LIMITED SALE ON NEW GUARANTEED TIRES AND TUBES

3,500 MILE GUARANTEE-Adjusted on a Mileage Basis

This Is an Exceptional Opportunity, as We Handle Only High Grade Tires and Tubes—All Fresh Stock. Standard Makes

Size	Tire	Tube	Size	Tire	Tube	Size T	ire T	ube
28x3	\$ 7.25	\$1.25	31x4	\$14.50	\$1.50	36x4½\$2	1.50	\$2.00
30x3		1.25	32x4	15.00	1.75	37x4½ 2	5.00	2.50
30x3½		1.40	33x4	15.50	1.75	37x5½ 2		2.50
32x3½	. 10.75	1.40	34x4	16.00	1.75	38x5½ 3	0.00	2.50

Add 10% for Non-Skid REAL BARGAINS IN

### SLIGHTLY USED TIRES AND TUBES

			All in Exc	cellent Cor	ndition			
Size	Tire	Tube	Size	Tire	Tube	Size	Tire	Tube
30x3	\$5.00	\$1.00	32x4	\$ 8.00	\$1.50	35×4½	\$10.00	\$1.75
	6.00	1.00	33x4	8.50	1.50	36x4½	10.00	1.75
32x3½	7.00	1.25	34x4	9.00	1.50	35x5	11.00	2.00
	8.00	1.50	34×4½	10.00	1.75	37x5	12.00	2.00
D . 1 1	1 1	C . 1 .		1000 1		0 0 D 11		

Do not delay your order! Send it at once with 10% deposit, balance C. O. D., subject to examination. We are Jobbers in all standard makes of Guaranteed Tires. Write for prices—we can save you money.

ACORN TIRE AND REPAIR COMPANY

1547 S. Michigan Avenue CHICAGO, ILLINOIS Phones-Calumet 5614-15

# igh Grade Tires and Tubes

5.000 MILE SECONDS

at the following prices without a guarantee. However, if you want a GUARANTEE FOR 3,500 MILES, add 20 per cent on these prices.

### BEST VALUES ON THE MARKET—A Trial Order Will Convince You

Size	Plain	Tubes	Size	Plain	Tubes	Size	Plain	Tubes
28x3	\$ 7.00	\$2.00	32x4	.\$14.00	\$3.35	35x41/2	\$21.45	\$4.20
30x3	7.00	2.00	33x4	. 14.50	3.50	36x41/2	22.00	4.30
30x31/2	8.75	2.30	34x4	. 15.00	3.65	37×4½	22.80	4.60
32x3½	10.50	2.45	35x4	. 15.85	3.75	35x5	23.10	4.65
34x31/2	11.50	2.70	36x4	. 16.20	3.85	36x5	23.95	4.75
31x4	13.75	3.20	34x4½	. 20.35	4.15	37x5	24.20	4.95

Add 10% to the above prices for non-skid tires

Order today—\$1 deposit required. Tires shipped by return express subject to examination. Specify whether Q. D., Clincher or Straight Side Rim.

### ARMSTRONG TIRE & VULCANIZING CO.

1336 Michigan Avenue, Chicago, Ill.

**BRANCH: 1614 MICHIGAN AVE** Phones: Cal. 5212; Cal. 2199

Parts for All Cars

New parts, consisting of Ring Gears, Pinion Gears, Transmission Gears, Shafts, Bearings, Axles; also a vast amount of Used Prest-O-Lite Tanks, Batteries and Magnetos, sacrificed to the public.

Above purchased by us at the recent bank-rupt Auto Parts Co. auction sale, and will therefore dispose of same at the greatest saving imaginable.

New Marion 35 H. P. motors, complete, with exhaust; our price, \$85.00; Auto Parts Co. price, \$150.00.

The following tires and tubes will be sold at these reduced prices for a short time only. Order at once.

Slightly Used tory Repaire	and Fac- d Cases	New	Serviceable Double Tread
	Tires	Tubes	Tires
28x3		\$1.85	\$ 4.15
30x3		2.00	4.75
30x31/2		2.45	5.80
32x3½	5.25	2.65	6.75
34x3½	5.50	2.75	7.00
31x4		2.80	6.95
32x4		2.90	7.15
33x4		3.35	7.80
34x4		3.50	8.00
35x4		3.00	8.75
36x4		3.65	9.40
34x41/2		3.80	9.65
35x41/2		4.00	10.15
36x4½		3.50	10.40
37x41/2	9.25	4.00	10.65
35x5		4.00	11.40
36x5	9.00	4.00	11.50
37x5	9.50	4.50	11.50

10% more for Non-Skid

One dollar deposit or sufficient to defray express charges required with each order.

Shipments Made Promptly Subject to Your Inspection

Send in your old tires to be Double Treaded. If junk, will pay you 6c per pound.

AUTO NEEDS CO.

1602 Michigan Ave.

Chicago, Ill.

# HUDSON SUPER TI

OUR PROPOSITION: Within the next thirty days we will appoint about thirty men or firms in both Eastern and Western territory to represent us as exclusive factory dealers in the sale and distribution of "HUDSON Super-Mileage TIRES."

4,000-MILE WRITTEN GUARANTEE WITH EVERY TIRE
Adjustments made on mileage basis of 30 miles to 60 miles per day, depending on size of tire.

	JOE	BERS' LOWES	T NET PRICES		
Tires	Non-Skid	Tubes	Tires	Non-Skid	Tubes .
28x3	\$ 7.25	\$1.80	31x4	\$14.35	\$2.95
30x3	7.60	1.90	32x4	14.75	3.05
30x3½	9.85	2.15	33x4	15.75	3.10
32x31/2	11 55	2 25	34×4	16.55	3 20

DON'T DELAY-WRITE QUICKLY

A great many men will read this page. If you can qualify for one of these exclusive territories, don't delay in writing us at once, giving full information about the territory, etc., you want.

BUY WHAT YOU NEED

Any order you care to send will be cheerfully accepted and handled with all the enthusiasm that is accorded the many large stock orders that come every day. It will pay you to order in large quantities on account of the saving to you in express charges.

All orders must be accompanied by Deposit of at least 25% in order to receive immediate shipment.

### HUDSON TIRE AND RUBBER COMPANY

Dept. Z, 1432 Michigan Avenue

**CHICAGO** 

# Popular Priced TIRES

Various Makes

Factory Firsts & Seconds

Size	Plain	Non- Skid	Size	Plain	Non- Skid
28x3	\$ 6.45	\$ 7.45	35x4	\$13.95	\$15.45
30x3	6.95	7.95	36x4	14.95	16.00
30x31/2.	8.45	9.45	34x41/2	17.45	19.45
32x31/2.	9.45	10.40	35x41/2	17.95	19.95
31x4	11.95	13.10	36x41/2	18.45	20.45
32x4	12.45	13.45	37x4	18.95	20.95
33×4	12.95	14.00	35x5	19.95	22,45
2.4 m. 4	12 45	14 45	27-5	20.05	22 75

We Pay Express Charges

Special Proposition to Good, Live Dealers

ATLAS TIRE COMPANY

822 N. Broad St.

Philadelphia, Pa.

X-L TIRES

Excellent for Service

A Standard Tire, Guaranteed 3,500 Miles
\$0x3 ... \$ 7.75 & 31x4 ... \$15.40 & 34x4 ... \$16.86
\$0x3\frac{1}{2}... & 10.04 & 32x4 ... & 15.73 & 35x4\frac{1}{2}... & 23.60
\$2x3\frac{1}{2}... & 11.77 & 33x4 ... & 16.41
Order today. \$10\text{\$\sigma}\$ deposit required; balance C. O. D.
Tires shipped by return express, subject to examination.

EXCEL RUBBER CO., Wadsworth, Ohio
Near Akron, "The Rubber City"

### WHY BUY NEW TIRES?

When we can retread your old ones and give yeu the same guarantee. We have a process of RE-BUILDING A TIRE, that will SAVE YOU MONEY. THINK OF IT, ONLY ONE-THIRD THE COST OF A NEW TIRE. WRITE TODAY, or better still, send that tire in and let us convince you—SEND ONE—YOU WILL SEND THE REST.

WEST SIDE VULCANIZING CO.

222 W. 5th Street Waterloo, Iowa

-LET US TIRE YOU-

AND YOU WILL NOT TIRE BUYING TIRES
GUARANTEED STANDARD MAKES
at Wholesale Prices—Write Today for Prices
WHOLESALE TIRE EXCHANGE
Chicago, Ill.

Tires. Magnetos and Service Stations.

Magnetos and Service Stations.

### SAVE ON

Don't Buy for Winter Use at Fancy Prices

Here's a great opportunity to buy a standard tire, with a 3,500-mile written guarantee, at real bargain figures.

Dargain figures,
Adjustments made on mileage basis of 30 to 60 miles per day, depending on size of tire.
We offer an unlimited supply of these tires—all new fresh stock (standard makes); slightly mould blemished.

### You Buy on Approval

### This Is Our Price List

SIZE		TUBES	SIZE	PLAIN	TUBES	SIZE	PLAIN	TUBES
30x3	\$ 8.45	\$1.95	33×4	\$18.50	\$3.75	35x41/2	\$26.45	\$5.00 5.25
30x3½	11.95	2.45	34x4	18.95	3.95	36x41/2	27.45	5.25
$30x3\frac{1}{2}$ $32x3\frac{1}{2}$	12.75	2.75	36×4	19.45	4.15	37x5	32.95	5.75
31x4	17.25	3.25	34×41/2	25.45	4.95		02.70	0.,0

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31x3½	5.00	1.50	34x4	7.75	1.70	37×4½	9.25	1.90
32x3½	5.25	1.50	35x4	7.25	1.75	35x5	8.00	2.00
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